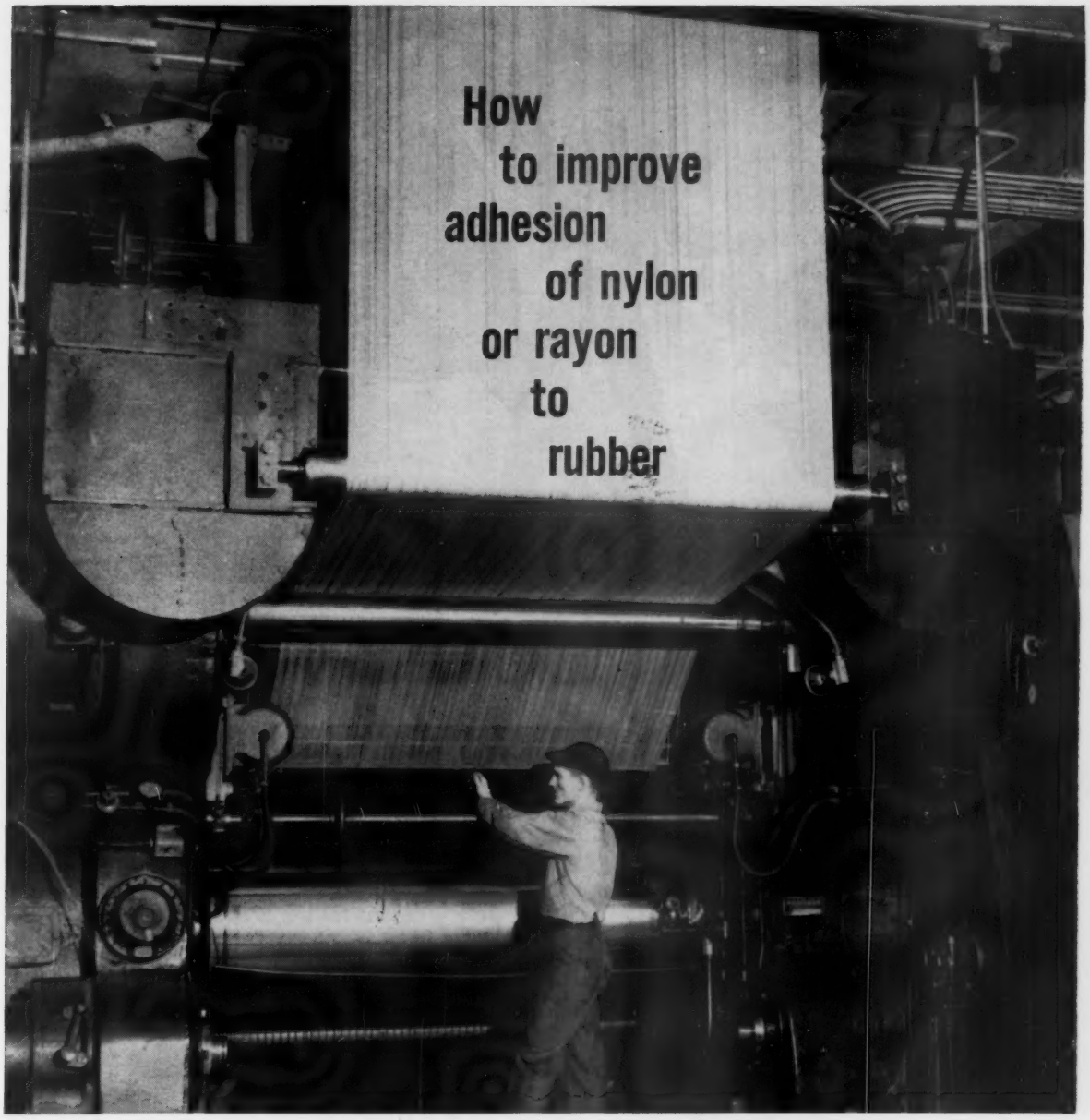

USE HYCAR 2518. This new vinyl pyridine latex resulted from years of study of problems relating to achieving better performance of fiber-reinforced rubber products. Using Hycar 2518 as pretreatment of man-made yarns, cord and fabric gives positive control, exceptionally high adhesion, easily processed formulations and good "green tack."

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To get more information about this or other ways you can produce better textiles, often at lower costs, write today for information to Department MC-8, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. In Canada: Kitchener Ontario.

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

AUGUST, 1961 VOL. 89, NO. 5

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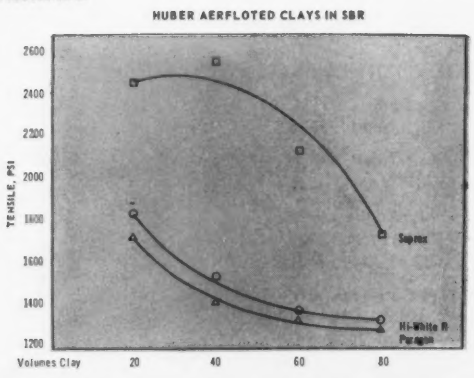
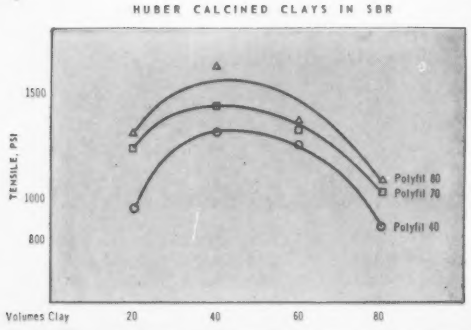
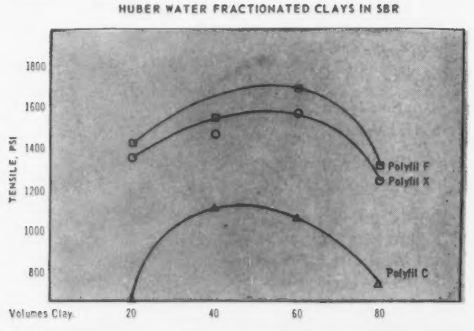


Calcined



Water Fractionated



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Highlights Sidelights *of the News . . .*

August, 1961

Goodyear has announced plans to spend $180 million in its capital expenditure program for 1961 and 1962 . . . The plans include new tire plants in Texas and Turkey, expansions of foreign plants, an addition to the Akron research library and modernization of domestic facilities . . . This is the largest two-year capital expenditure program in the company's history (page 822).

ASTM Committee D-11 on Rubber and Rubberlike Materials and twenty-two of its subcommittees met on June 27 to 30, 1961 during the 64th Annual Meeting of the parent society . . . Simon Collier, chairman of D-11, and John Allen, secretary of D-11, were both honored by the parent group during the meeting (page 817).

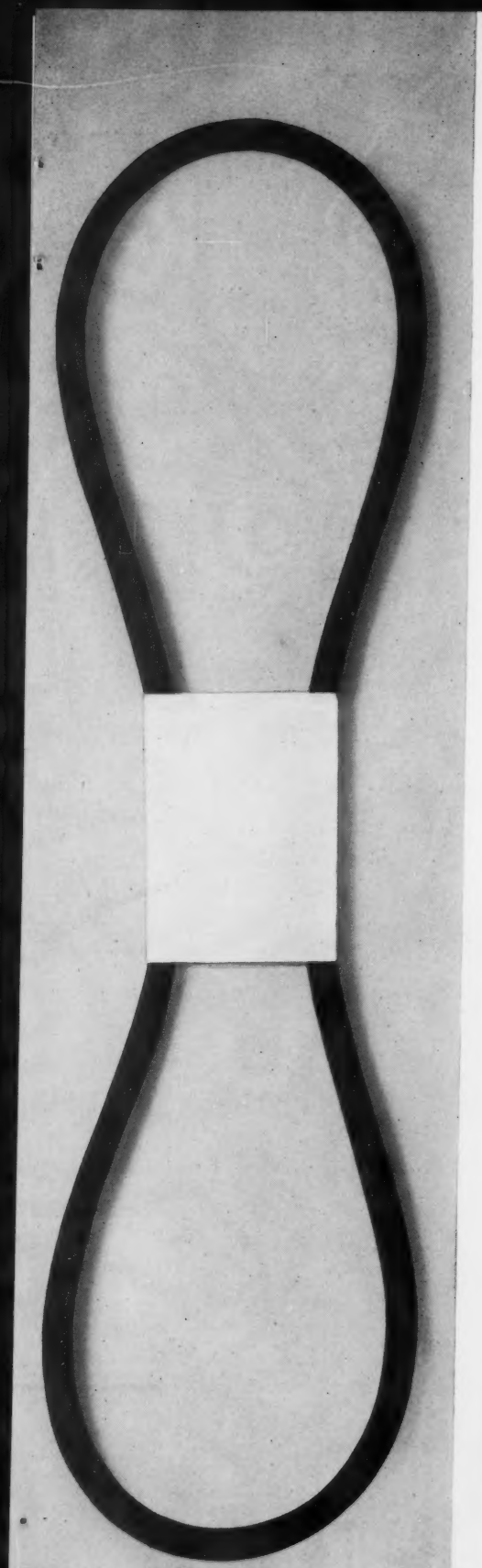
Over 100 persons attended the Annual Meeting of the Molded and Extruded Products Division of the Rubber Manufacturers Association held on June 26 to 28 at White Sulphur Springs, W. Va. . . . Topics under discussion included an appraisal of the "New Frontier," current labor problems, planning and programming for the sales staff, and the profit squeeze (page 826).

The oil-extended rubber patent suit between Firestone and General Tire will be heard in the U.S. District Court in Baltimore, Md., in accordance with a recent ruling by the courts . . . A motion by General Tire to dismiss the Firestone suit was denied by the court which also ruled that General Tire could not press for dismissal of actions filed elsewhere (page 822).

The Canadian Government is reported to be considering the advisability of selling the Crown-owned Polymer Corp. at Sarnia, Ont., Canada, to private interests . . . The question as to whether the company may have outgrown government ownership arose when company president Rowzee asked for approval of a $30 million expansion program in Europe . . . This is more than the company can finance out of retained earnings (page 836).

President Kennedy has signed into law the new highway financing bill which raises excise taxes on tires, inner tubes and tread rubber . . . The new law raises taxes on tires from 8 to 10¢ a pound and on tubes from 9 to 10¢ per pound . . . The tax on tread rubber has been increased from 3 to 5¢ a pound (page 821).

AUTOMOTIVE HEAT



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coming events

Aug. 18. Philadelphia Rubber Group, Golf Outing, Manufacturers Country Club, Oreland, Penna.

Aug. 28-Sept. 1. Gordon Research Conferences, Adhesion, New Hampton School, New Hampton, N. H.

Sept. 3-8. American Chemical Society, 140th National Meeting, Chicago, Ill.

Sept. 5. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Sept. 5-8. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

Sept. 13-15. Air Force Systems Command, Aeronautical Systems Division, Symposium on Materials in the Space Age, Phoenix, Ariz.

Sept. 16. Connecticut Rubber Group, Annual Outing.

Sept. 21. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Sept. 24-27. American Institute of Chemical Engineers, 45th National Meeting, Lake Placid Club, Lake Placid, N. Y.

Sept. 25-28. Industrial Building Exposition & Congress, New York Coliseum, New York, N. Y.

Sept. 28. Southern Ohio Rubber Group, Fall Technical Meeting.

Sept. 28-30. American Society for Quality Control, Chemical Division, 5th Annual Chemical Conference, Daniel Boone Hotel, Charleston, W. Va.

Oct. 3. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Oct. 5. Detroit Rubber & Plastics Group, Fall Meeting, Wolverine Hotel, Detroit, Mich.

Oct. 5. Society of Plastics Engineers, Regional Technical Conference on Plastic Foams, Buffalo, N. Y.

Oct. 10. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

Oct. 10-12. American Standards Association, 12th National Conference on Standards, Rice Hotel, Houston, Texas.

Oct. 12. Northern California Rubber Group, Past-Presidents' Night, Berkeley, Calif.

Oct. 13. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 16-20. National Safety Council, 49th Annual Convention, Conrad Hilton Hotel, Chicago, Ill.

Oct. 20. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

Oct. 30. Joint Meeting of New York, Connecticut and Philadelphia Rubber Groups, Henry Hudson Hotel, New York, N. Y.

Nov. 2. Rhode Island Rubber Club, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 3. Philadelphia Rubber Group, Fall Dance, Manufacturers Country Club, Oreland, Penna.

Nov. 7. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Nov. 16. Northern California Rubber Group, Technical Meeting, Berkeley, Calif.

Nov. 17. Connecticut Rubber Group, Technical Meeting.

Nov. 17-18. Southern Rubber Group, Memphis, Tenn.

Nov. 26-Dec. 1. American Society of Mechanical Engineers, Winter Annual Meeting, Statler Hilton Hotel, New York, N. Y.

Dec. 1. Tenth Annual Wire & Cable Symposium, Berkeley-Carteret Hotel, Asbury Park, N. J.

Dec. 2. Northern California Rubber Group, Christmas Party.

Dec. 7. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Dec. 8. Detroit Rubber & Plastics Group, Christmas Party, Statler Hilton Hotel, Detroit, Mich.

Dec. 8. Los Angeles Rubber Group, Christmas Party, Beverly Hilton Hotel, Beverly Hills, Calif.

Dec. 9. Southern Ohio Rubber Group, Christmas Party.

Dec. 12. Buffalo Rubber Group, Christmas Party, Buffalo Trap and Field Club, Buffalo, N. Y.

Dec. 15. Boston Rubber Group, Christmas Party, Somerset Hotel, Boston, Mass.

Dec. 15. New York Rubber Group, Christmas Party, Henry Hudson Hotel, New York, N. Y.

Dec. 26-31. American Association for the Advancement of Science, Chemistry Division Annual Meeting, Denver, Colo.

Jan. 26, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

Jan. 30-Feb. 2, 1962. Society of Plastics Engineers, 18th Annual Technical Conference, Penn-Sheraton Hotel, Pittsburgh, Penna.

Feb. 5-9, 1962. ASTM Committee Week, Statler Hilton Hotel, Dallas, Texas.

Feb. 7-9, 1962. Committee D-11 on Rubber and Rubber-Like Materials, ASTM, Statler Hilton Hotel, Dallas, Texas.

Feb. 8, 1962. Fort Wayne Rubber & Plastics Group, Technical Meeting, Van Orman Hotel, Fort Wayne, Ind.

March 2-4, 1962. Boston Rubber Group, Ski Weekend.

March 20-29, 1962. American Chemical Society, 141st National Meeting, Washington, D. C.

March 23, 1962. New York Rubber Group, Spring Meeting.

April 5, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

April 24-27, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Statler, Boston, Mass.

April 26, 1962. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

May 22-25, 1962. Institution of the Rubber Industry, 4th International Rubber Technology Conference, Church House, Westminster, London, England.

June 7, 1962. New York Rubber Group, Summer Outing.

June 22, 1962. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 24-29, 1962. ASTM Annual Meeting and Apparatus Exhibit, Hotel Statler, New York, N. Y.

August 2, 1962. New York Rubber Group, Golf Outing.

Sept. 9-14, 1962. American Chemical Society, 142nd National Meeting, Atlantic City, N. J.

Sept. 30-Oct. 5, 1962. ASTM Pacific Area Meeting and Apparatus Exhibit, Hotel Statler, Los Angeles, Calif.

Oct. 16-19, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Cleveland, Cleveland, Ohio.

Oct. 19, 1962. New York Rubber Group, Fall Meeting.

Nov. 25-30, 1962. American Society of Mechanical Engineers, Winter-Annual Meeting, Statler Hilton Hotel, New York, N. Y.

Dec. 14, 1962. New York Rubber Group, Christmas Party.

Feb. 4-8, 1963. ASTM Committee Week, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

March 31-April 5, 1963. American Chemical Society, 143rd National Meeting, Los Angeles, Calif.

May 7-10, 1963. Division of Rubber Chemistry, American Chemical Society, Royal York Hotel, Toronto, Ontario, Canada.

Sept. 10-13, 1963. Division of Rubber Chemistry, American Chemical Society, Hotel Roosevelt, New York, N. Y.

April 28-May 1, 1964. Division of Rubber Chemistry, American Chemical Society, Sheraton-Cadillac Hotel, Detroit, Mich.

Sept. 1-4, 1964. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

May 4-7, 1965. Division of Rubber Chemistry, American Chemical Society, Fountainebleau Hotel, Miami Beach, Fla.

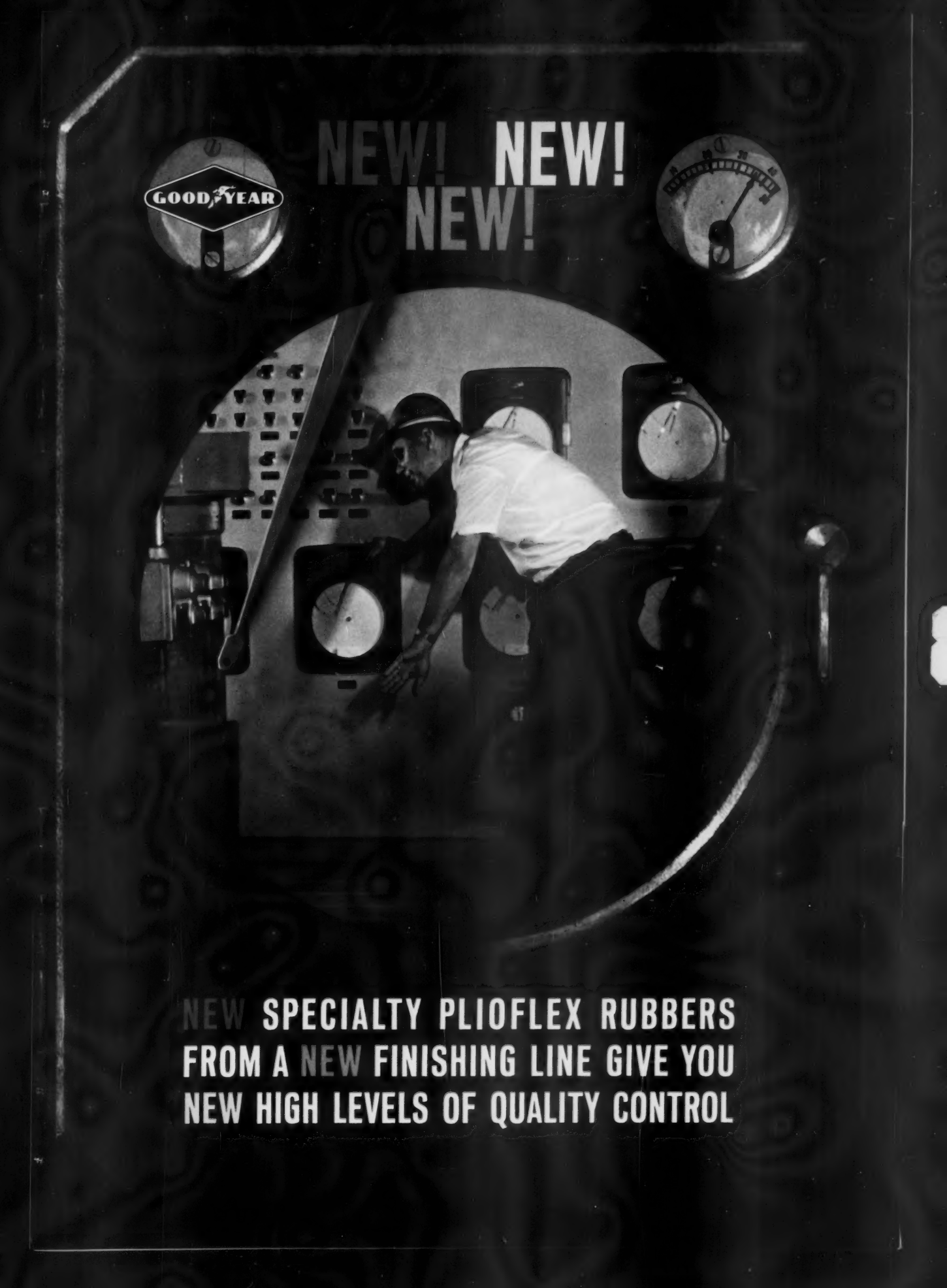
Oct. 19-22, 1965. Division of Rubber Chemistry, American Chemical Society Bellevue-Stratford Hotel, Philadelphia, Penna.

May 3-6, 1966. Division of Rubber Chemistry, American Chemical Society, Fairmount Hotel, San Francisco, Calif.

Sept. 13-16, 1966. Division of Rubber Chemistry, American Chemical Society, New York, N. Y.

May 2-5, 1967. Division of Rubber Chemistry, American Chemical Society, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

Sept. 12-15, 1967. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.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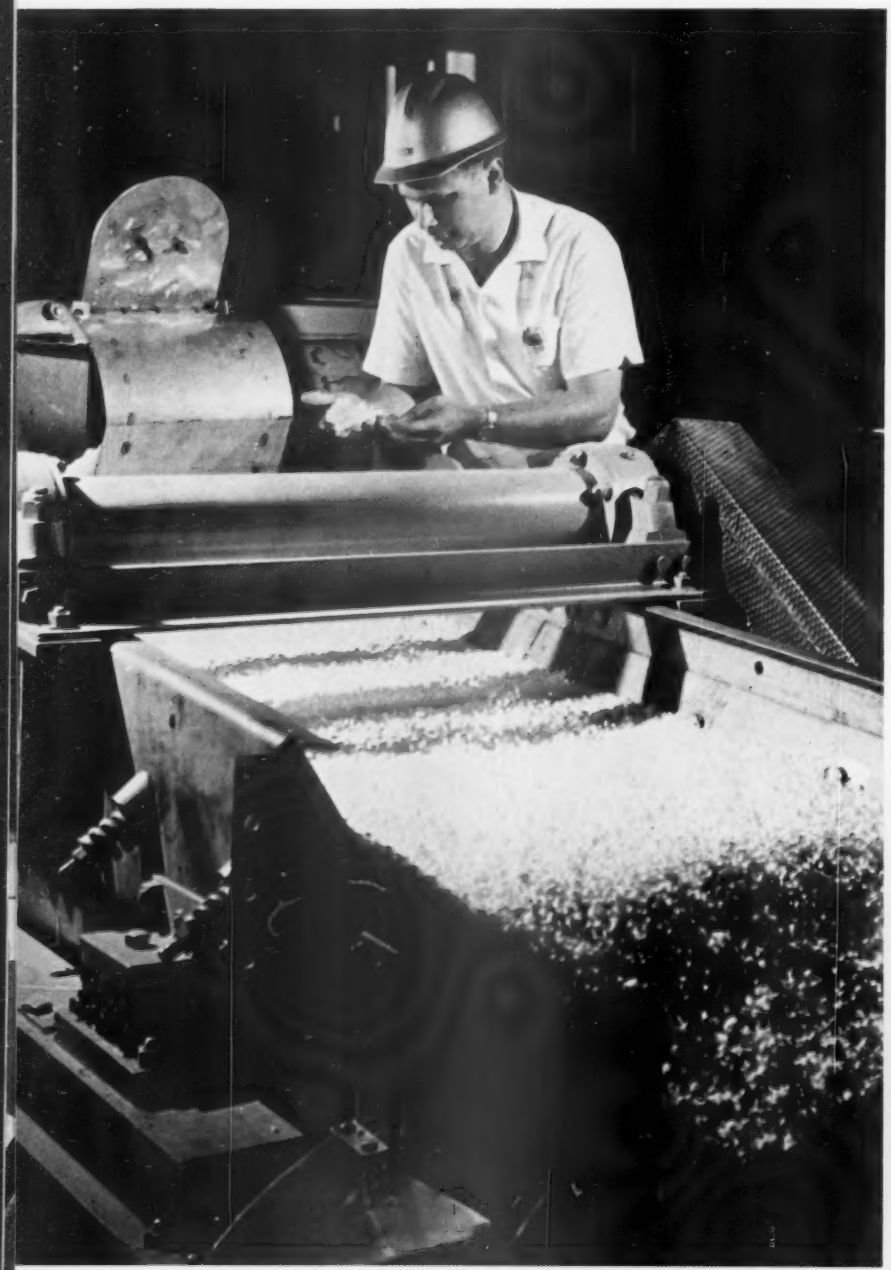

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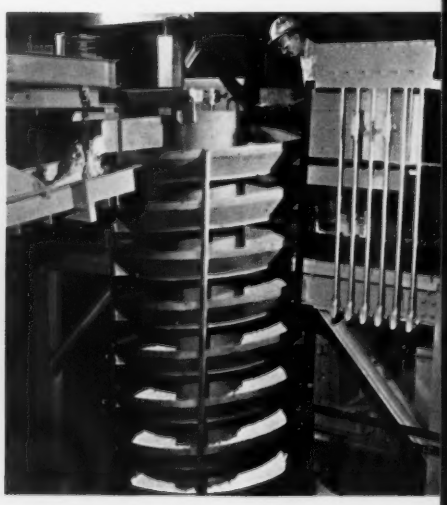

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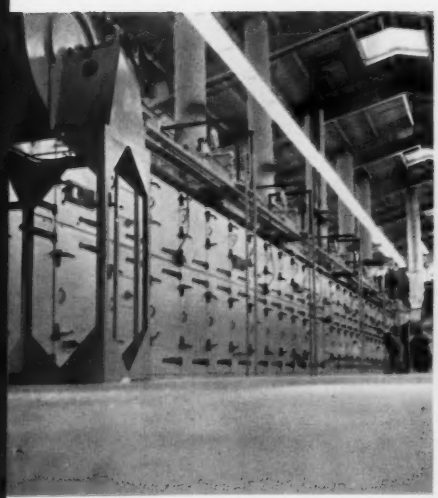

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PROBLEM: Cut rejects in manufacture of low-cost, rubber flower pots.
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PROBLEM: Cut costs on daily output of 2 million pencil erasers.
PROBLEM-SOLVER: PLIOFLEX 1006. Its processing ease, uniformity and cleanliness eliminated premastication and permitted reuse of scrap without grinding, while providing a better aging product.

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PROBLEM: Improve production of blown rubber kneeling pads while maintaining quality.
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PROBLEM: Upgrade performance and sales appeal of car mats without raising costs.
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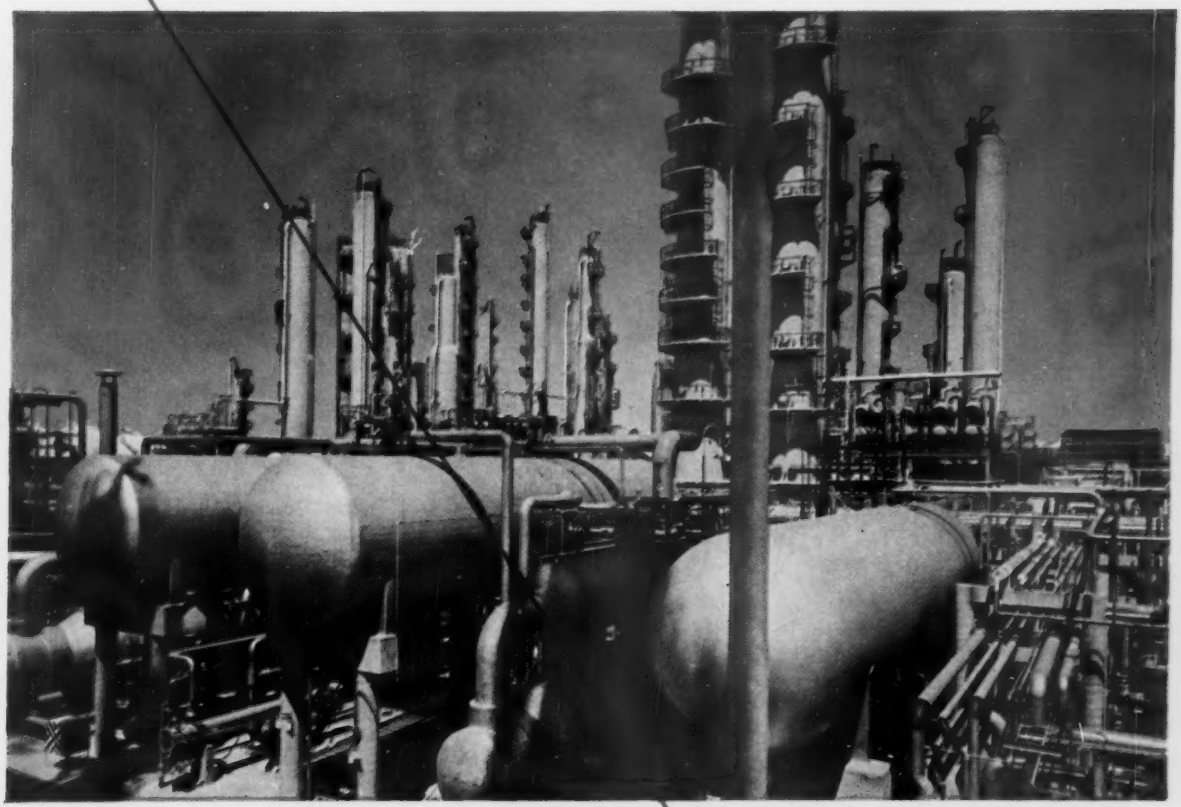

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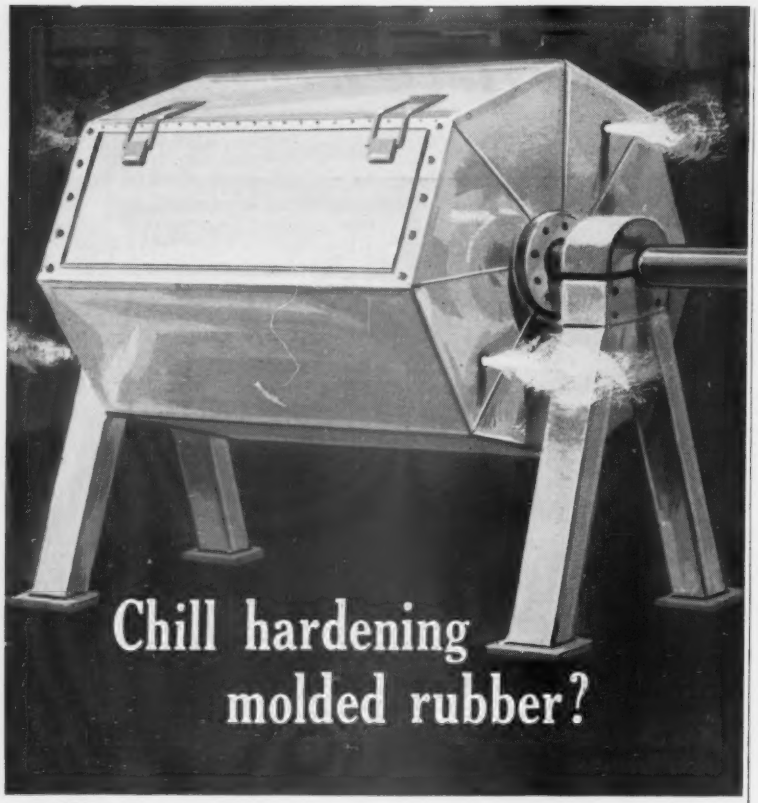

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News in Brief

► Characteristics and applications of Wing-Stay 100, an antioxidant-antiozonant, and Plioflex, a general purpose butadiene-styrene rubber, are described in two brochures available from the Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio.

► The Foxboro Co., Foxboro, Mass., will acquire the assets of Waugh Engineering Co., Van Nuys, Calif., in exchange for 12,806 shares of its common stock. The firm will be operated as a division of Foxboro under the direction of its founder, Charles C. Waugh.

► A 48-page booklet entitled "Profitable Management for Main Street," dealing with a variety of business problems through selected case histories, is available free of charge from the Public Relations Division of Dun & Bradstreet, Inc., New York, N. Y.

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., will build a pilot plant at Richmond, Va. for the production of a new fiber known as HT-1, a high temperature-resistant polyamide.

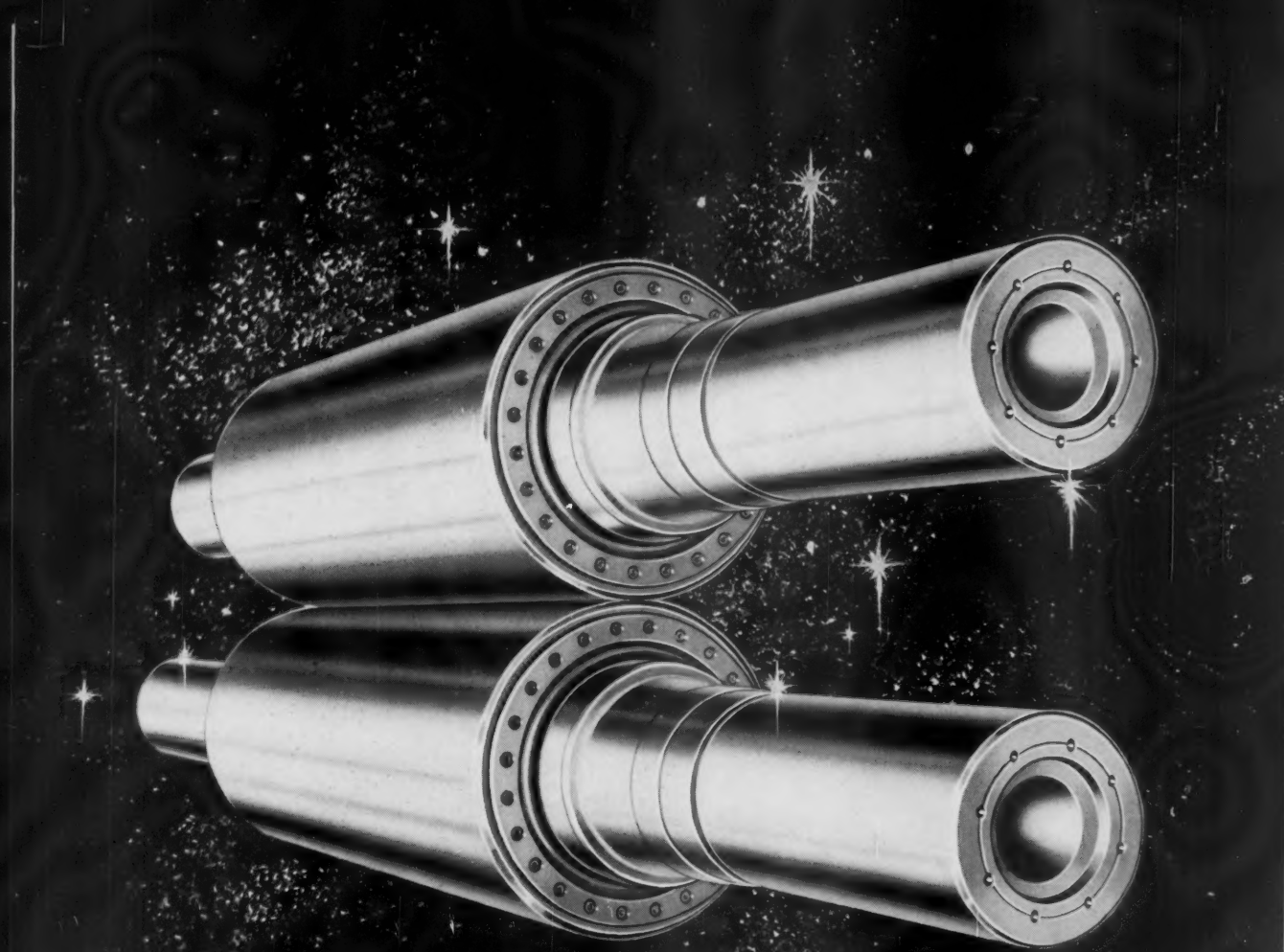
► Aranox, a semi-nondiscoloring antioxidant for natural rubber, SBR, and neoprene, is described in a four-page booklet called "Aranox," issued by Naugatuck Chemical, Naugatuck, Conn.

► A four-page, illustrated technical bulletin, offered by the General Electric Co., Waterford, N. Y., describes rubber compound SE-5504U, the first of a series of new G-E self-bonding silicone rubber compounds.

► Firestone Tire & Rubber Co., Akron, Ohio, and 16 separate Firestone divisions have received National Safety Council Awards for excellent safety records in 1960.

► Color-Pak, a custom color-matched concentrate system for Escon polypropylene, is now available to plastic fabricators from Enjay Chemical Co., New York, N. Y.

► The latest data on ZMBT accelerator and Pepton 65 plasticizer are available from the Rubber Chemicals Department, American Cyanamid Co., Wallingford, Conn.



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MAGLITE® Registered Trademark of Merck & Co., Inc.; Magnesia (Synthetic Calcined Magnesite).

Overseas

Turkey—The Government of Turkey has authorized the Goodyear Tire & Rubber Co., Akron, Ohio, to form a company in association with local interests to build a tire factory. The new company will be known as Goodyear Lastikleri Turk Anonim Sirketi, and will be capitalized at $13 million. Under terms of the authorization, the factory must be in production within two years. Initial capacity will include a complete line of passenger, truck and agricultural tires and tubes, as well as tread rubber and other tire repair materials.

Liberia—Rubber production in 1960 totaled 95,600,000 dry rubber content pounds, about 270,000 pounds less than in 1959. Exports amounted to 94,921,757 d.r.c. pounds, compared with 95,051,525 in 1959. The rubber industry in Liberia is reported to be facing not only declining prices, but a growing labor shortage. Approximately 5,000 acres of rubber trees on independent plantations went untapped in 1960 because of unavailability of labor.

India—The annual report of the Rubber Board covering the period 1959-1960 shows that production of raw rubber in India amounted to 24,173 tons—four tons more than in 1958-1959. Rubber consumption in the same period rose by nearly 5,000 tons to 40,490 tons. The Rubber Board also reports that over 21,000 acres were planted with rubber, bringing the total rubber planted area to 305,452 acres.

Malaya—Dunlop Rubber Co., Ltd., has reached a final agreement with the Malayan Government on a project for the production of a wide range of tires in the Federation of Malaya. Dunlop will establish a factory on a site already acquired at Petaling Jaya, near Kuala Lumpur. The plant is expected to be completed in about 18 months' time, and will produce car, truck, motorcycle and bicycle tires.

Italy—According to the National Association of Rubber, Cable and Allied Industries, total output of tires and other rubber products in 1960 amounted to 202,000 tons, compared with 156,000 tons in 1959. The increased volume of production for the rubber industry was attributed primarily to increased demand from the automobile industry.

Ceylon—Under emergency regulations now in force, the Government of Ceylon has declared that all work related to the planting, manufacturing, or production of rubber is an essential service, and that any strikes would be illegal.

What's News in Rubber...

Enjay Butyl smooths the bounce out of bumps!

For built-in shock absorption and damping, Enjay Butyl has proved to be outstanding in product after product. The illustration above shows why. Unlike ordinary rubber (red ball) which shows extended bounce when dropped, Enjay Butyl (blue ball) absorbs shock with almost no bounce at all! Results—in automobile engine mounts and axle bumpers – greater shock absorption for smoother rides; in tires – road-hugging performance, quieter, safer stops and no squeal even on sharpest curves.

In addition, Enjay Butyl offers many other outstanding properties such as impermeability to gases and resistance to chemicals, heat, weather, ozone and aging. In addition to Butyl, there is new Butyl Latex and Butyl HT-10-66 (halogenated for high heat resistance and faster cures). In rubber, plastics, chemicals and oil additives, chances are that Enjay has the product to solve your problem. Write to us at 15 West 51st Street, New York 19, N. Y.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

ENJAY CHEMICAL COMPANY

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ENJAY

BULLETIN:

Shell announces new oil-extended Shell Isoprene Rubber 500—first type of polyisoprene at SBR prices

Shell Isoprene Rubber is the first commercially made synthetic to duplicate the molecular structure of natural rubber.

Now, Shell has developed an oil-extended form of Shell Isoprene Rubber. New Type 500.

The result is a polymer that combines the advantages of tree-grown rubber with the uniformity and economy of SBR.

This report answers nine questions about new Type 500.

A test sheet of Type 500 in a gum stock formulation. Note its clarity. Non-discoloring Type 500 is an economical choice for footwear and mechanical goods.

1. Is the polymer in Type 500 the same as in regular Shell Isoprene Rubber Type 305? No. The polymer in Type 500 is made to a higher molecular weight. Type 500 also contains 25 parts of nonstaining naphthenic oil to 100 parts rubber.

2. What color is it? Very light colored. Both the oil and antioxidant are selected to permit Type 500's use in products where light color is essential.

3. Is it compatible with other elastomers? Yes. New Shell Isoprene Rubber Type 500 can be blended in any proportion with natural rubber, SBR, Neoprene, nitriles and many others.

4. How should Type 500 be formulated? Use less accelerator than with regular Shell Isoprene Rubber (Type 305) or natural rubber; otherwise compounding is identical.

5. Can it be processed in conventional equipment? Yes. Its processing characteristics and vulcanization techniques are similar to those of Shell Isoprene Rubber Type 305 and natural rubber.

NOTE: New Type 500 withstands extended processing better than either polyisoprene or Hevea.

6. What can it be used for? It was primarily designed for mechanical goods, footwear and carcass stocks. Experimentation will undoubtedly yield other applications.

7. What does it cost? It now sells for 21.5¢ per pound, f.o.b. Torrance, California. Or 22.6¢ per pound carloads or truckloads delivered buyer's works.

8. Where can you get it? From any Shell Synthetic Rubber sales office. Their locations are: 500 Summer St., Stamford, Conn., (DA 5-1581); 20575 Center Ridge Road, Cleveland 16, Ohio, (ED 3-0600) and 5230 Clark St., Lakewood, Calif., (SP 3-4997).

NOTE: Mixed loads of Shell Isoprene Rubber Type 500 and other Shell polymers can be ordered at applicable carload prices.

9. How can I get samples and technical information? Contact one of the three Shell sales offices listed. Or write: Shell Chemical Company, P. O. Box 216, Torrance, California.

A Bulletin from

Shell Chemical Company

SHELL

Synthetic Rubber Division

capitol cues

WATCH THE CONSUMER FOR A CLUE TO THE RECOVERY'S SPEED--whether the current business upturn will be mild or rapid. So far, the expansion has been much greater than generally expected. But the big test will come this Fall, when the first surge starts to slow. This is when higher spending by the consumer will be so crucial. Many analysts think he will come through.

The recovery to date has come mainly from industry's recent shift in inventory policy--from heavy liquidation to modest rebuilding. This has spurred ordering, hiring, production--a 3% rise in economic activity. This Summer, U.S. outlay and business investment in new plant will manage to maintain some momentum. But it will take something extra to start a boom.

That "extra" may well come from the consumer. Here's why:
-Personal income is up $10 billion over 1960...and will keep rising with additional jobs and longer hours. The record shows that folks tend to spend the bulk of any new income.
-Instalment debt outstanding fell in the first part of the year--a trend usually reversed after a recovery has begun. So consumers are in good shape to borrow for wanted things.
Some economists forecast a 5% jump in retail sales this Fall.

YOU'LL SEE A CHANGE IN BUSINESS PSYCHOLOGY in the next month or so--a shift from the doubts about the scope of recovery that bothered businessmen during the late Spring. The recent letdown was par for the course--the kind of questioning that always occurs just after the first phase of a recovery.

FEARS OF RENEWED INFLATION ARE BEING EXAGGERATED these days, in the view of many economists in government and industry. Even though the upturn proves to be vigorous, it is felt that men, money, and plant capacity are in very ample supply. The deficit building up for fiscal 1962 may be larger than the $3.7 billion the Treasury is now predicting, but it won't generate a dangerous amount of new credit. The only real threat seen is from a cost-push spiral--excessive wage demands or hikes in administered prices.

Negotiated wage increases are running a bit behind last year. Recent price stability has taken the wind out of union sails. And unions are concentrating on job security, insurance, etc. Wage hikes will average $8\frac{1}{4}$¢ an hour, as against 9¢ last year.

Note the recent rash of price cuts in basic materials--paper, copper, glass, steel, etc. They're a result of competition, foreign and domestic. The stock market may not like them, but U.S. officials regard them as healthy. At long last, they believe we may be in for good times without inflation.

This doesn't mean that there won't be some price increases. Recovery is bound to catch some scattered commodities in short supply...at least temporarily. More importantly--but still months away--will be higher U.S.-supported prices for Latin American items, to be negotiated starting this Summer.

capitol cues (cont'd)

GOVERNMENT PRESSURE WILL BE USED TO HEAD OFF PRICE HIKES this year--still another factor that will tend to keep inflation in check. In the case of steel, for example, the President's Council of Economic Advisers has tried to project profit and productivity trends to show that a price rise isn't necessary. If the mills try hikes later this year, Kennedy will blast them.

UNIONS SEEM LESS INCLINED TO GO OUT ON STRIKE, according to labor experts. Rank-and-filers aren't very keen on walking out with unemployment so great and just when the work-week--and their pay-checks--are stretching out. Besides, union leaders know that the U.S. will move in to end strikes that could interfere with recovery--thus casting labor in a poor light.

A RAPID INCREASE IN CORPORATE PROFITS is being projected for 1962 on the basis of expected increases in business activity. There's growing acceptance of forecasts of a 3-4% pick-up in total output later this year and a whopping 8% next year. Price cuts may operate to squeeze net margins but the rising productivity that comes with recovery will more than offset.

> The slide in profits ended last Spring. The rise now under way will bring earnings before taxes for 1961 to about $44 billion--same as last year. But in '62, the total will jump to well over $50 billion--to a new record. The stock market is expected to reflect this improvement, starting this Fall.

YOU'RE GOING TO SEE MUCH FASTER ECONOMIC GROWTH in the next decade, according to a little-noticed study by the non-partisan National Planning Association. The forecasts project a rate of expansion of between 4½% and the 5% of the Democratic Platform. This will be well above the 2.3% of the second half of the Fifties, and will even top the more standard U.S. 3%.

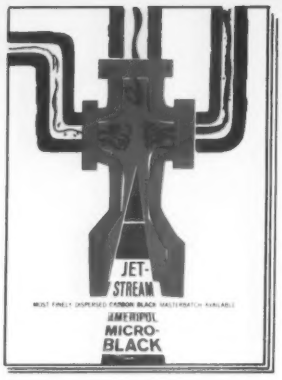
> Three factors will be mainly responsible for this step-up:
> -Increased productivity, up by 46% during the next 10 years.
> -A larger labor force, reflecting increases in population.
> -Increased plant capacity, plus vast outlays for research.

BUSINESS IN CANADA IS BOUNCING BACK BRISKLY from a sharp recession. Main reasons are fast-rising exports--including foodstuffs to Red China--a relatively large government deficit, and improving business in the U.S. (Business activity in this country has an enormous impact on our neighbor.) Economists feel that Canada's total output will be up about 4% this year.

THE BILL TO LIMIT EXPENSE ACCOUNTS IS CURBING OUTLAYS already, even though Congress has yet to enact the Kennedy proposals--and probably won't pass them this year. Some companies are taking advantage of the pressure that's been generated to revamp their own policies. This way, they'll be ready if and when a bill passes...or if the Internal Revenue Service cracks down on present practices under authority that may already be on the books.

> What these companies are doing is telling their employees to curtail travel and entertainment expenses. As far as they can, these firms are trying to hold to the limits on hotels and meals embodied in the Administration's bill--$30 a day. The hold-downs are being extended to lavish entertainment of customers...and many restaurants are already complaining.

MOST FINELY DISPERSED **CARBON BLACK** MASTERBATCH AVAILABLE



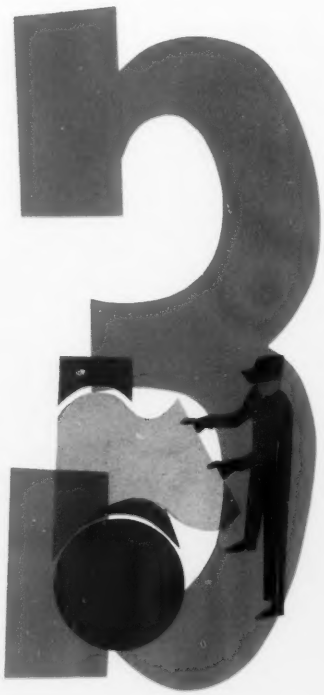
Before the Micro-Black process even begins, particles of carbon black are pulverized and ground to extremely small size—called "smoke". Then, in a series of mixing jets, the carbon black slurry, oil, and latex are mixed in a high shear agitation process. Velocity of the liquid stream at the nozzles actually reaches hundreds of miles per hour. The result is the most finely dispersed carbon black masterbatch available.

3 WAYS YOU SAVE WITH AMERIPOL MICRO-BLACK

IMPROVED PRODUCT QUALITY. . . carbon black is the best reinforcing agent—and the better the dispersion, the more carbon black contributes strength and resistance to wear. MICRO-BLACK's fine dispersion gives you the ultimate in quality and performance.

STREAMLINED STORAGE

. . . Micro-Black is packaged for easy, fast handling, and eliminates the cost of in-plant storage of carbon black.



FASTER PRODUCTION

. . . Micro-Black comes to you with latex and carbon already precisely mixed. This eliminates time-consuming weighing and milling operations, and shortens mixing time. And clean-up time between runs is reduced.

NEW OIL-EXTENDED AMERIPOL 4771 CUTS COSTS;

provides wide range of physicals with selective compounding

Ameripol 4771 is a new non-staining Micro-Black Masterbatch with 50-part oil extension for economy. Added oil makes a softer stock, with little sacrifice in tensile strength. 4771 reduces mixing costs and permits increased loading.

As with all Micro-Black Masterbatches, superior physical properties are obtained by the use of high shear agitation of the polymer, oil, and carbon black, followed by immediate coagulation.

A series of tests with different compounds based on Ameripol 4771 shows how you can economize on your inventory by using such a versatile Micro-Black. A wide range of hardness (frequently an important property in mechanical goods operation) can be obtained with selective compounding of Ameripol 4771. This permits carrying fewer compounds in stock to meet most major requirements.

In the test recipes listed here, a series of stocks of different hardness are all based on Ameripol 4771. Hardness can be increased or decreased as desired by varying the amount of filler and or softener to the base compound. The recipes shown vary in Durometer hardness from 35 to 94, and intermediate values can be obtained by blending.

It is believed that the work to date has given sufficient information to serve as a guide for conducting detailed application studies. In the low-cost, highly mineral-filled formulations it may be necessary to adjust the acceleration to compensate for the retarding effect of the clay.

RECIPES OF DIFFERENT HARDNESS BASED ON AMERIPOL 4771

	A	B	C	D	E
Ameripol 4771	150.00	150.00	150.00	150.00	150.00
Zinc Oxide	4.00	4.00	4.00	4.00	4.00
Stearic Acid	1.00	1.00	1.00	1.00	1.00
Dixie Clay	—	100.00	100.00	100.00	100.00
Goodrite 2007	—	—	—	—	20.00
Agerite Resin D	0.75	0.75	0.75	0.75	0.75
Sun Anti-chek	0.75	0.75	0.75	0.75	0.75
#210 Brown Sub	30.00	30.00	15.00	—	—
Paraflux #2016	15.00	15.00	7.50	—	—
Circosol 2XH	15.00	15.00	7.50	—	—
Santocure	1.00	1.00	1.00	1.00	1.00
Cumate	0.10	0.10	0.10	0.10	0.10
Sulfur	2.00	2.00	2.00	2.00	2.00
TOTAL	219.60	319.60	289.60	259.60	279.60

PHYSICAL PROPERTIES OF TEST RECIPES

	Cure, Min. at 307°F	A	B	C	D	E
Tensile, psi	5	1305	590	1135	1310	1305
	10	1430	950	1460	1590	1555
	20	1495	1130	1535	1695	1610
Elongation, %	5	875	880	705	495	455
	10	770	800	595	415	390
	20	705	715	535	350	330
Durometer Shore A	5	33	51	60	78	90
	10	34	53	64	79	93
	20	35	54	65	80	94
Comp. Set, Method B	20'/ 320°F	41.0	61.2	46.8	39.6	42.1
Specific Gravity		1.11	1.35	1.39	1.48	1.45

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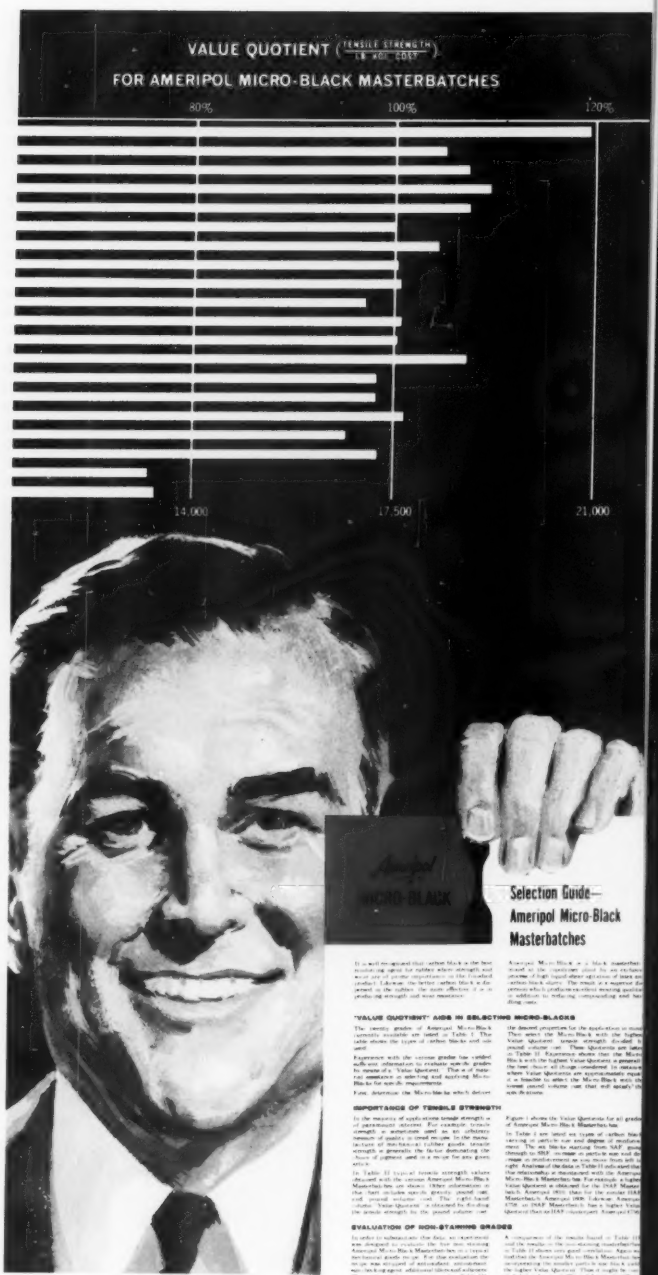
NOW... 20 MICRO-BLACK MASTERBATCHES OFFER A WIDE SELECTION OF PROPERTIES

With twenty grades of Ameripol Micro-Black now available, you can precisely select the combination of properties and costs that meet your requirements. And experience with the various grades have yielded enough data to provide an accurate selection guide.

A new bulletin "Selection Guide to Ameripol Micro-Black Masterbatches" gives complete data and lists "Value Quotients" for the various grades.

A chart contained in this Selection Guide plots various tensile strengths (often a matter of prime interest) and pound volume cost. Use of the "Value Quotient" gives you an easy method of evaluating and selecting the masterbatch you need.

For your copy, write Goodrich-Gulf Chemicals, Inc., 1717 East Ninth Street, Cleveland 14, Ohio.



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WORLD'S LARGEST SOURCE OF SYNTHETIC RUBBER

Quick answers to everyday problems on the major synthetic rubbers

SYNTHETIC RUBBER TECHNOLOGY

By W. S. Penn, B. Sc.

5½ x 8½ in. 326 pp. $8.50

Here, in Volume I of a two-volume series, is the first practical textbook devoted to the compounding and processing of the major synthetic rubbers . . . major from the standpoint that they are standard polymers whose techniques, although they will obviously change, will change more slowly than other synthetic rubbers not covered in the first volume. The newer materials will be covered in Volume II.

Elastomers covered in the current work include SBR, butyl rubber, neoprene, nitrile rubber, silicone rubber, Thiokol and high styrene resins. Modern and practical compounding techniques are given. Actual results are shown in the form of tables rather than the stylized results usually given in curves. Illustrations are not included since the book is not an elementary exposition of compounding and processing methods.

The author, Dr. Penn, is a graduate of London University and has spent all his working life in the rubber industry. He has specialized in synthetic rubbers, with many years experience in all branches of the industry. At present, he is Manager of the Synthetic Rubber and Plastics Division of Richard Klinger, Ltd., of England.

This book is a joint publication of Maclaren & Sons, Ltd., of London, England, and the Palmerton Publishing Co., Inc., of New York. Volume II, covering the newer synthetic rubbers, will be available within the next several months.

Partial Table of Contents

General Laboratory and Factory Practice

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Compounding and Processing of SBR

SBR in Tires and Other Products

Compounding and Processing of High Styrene Copolymers

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Butyl Rubber in Tires, Cables and Other Products

Compounding of Neoprene

Processing of Nitrile Rubbers

Fabrication of Silicone Rubber Products

Processing, Properties and Applications of Thiokol

Applications of High Styrene Copolymers

Special Properties of Nitrile Rubbers and Their Uses

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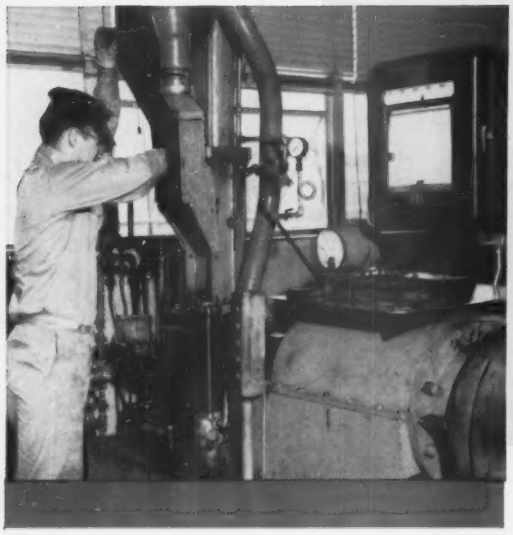

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SUBJECT:	Hydroxylamine Salts	DESCRIPTION:	Versatile nitroparaffin derivatives with unlimited application possibilities
ACTION DESIRED:	Consider them for synthesis, purification, for your research projects		

Hydroxylamine salts have reactivity characteristics possessed by no other chemical. Industry is now using these versatile nitroparaffin derivatives in ever increasing quantities, and new applications are continually being discovered. As reducing agents, oxidizing agents — for synthesis, purification and biological systems — hydroxylamine salts offer you unlimited opportunity in research and product development.

Oxidation — reduction.

Hydroxylamine salts are well-known reducing agents for metal ions such as ferric, cupric, and silver, and also for non-metallics such as organic peroxides and certain dyes. Because of this property, these salts have found industrial applications in dyeing, purification, and refining processes. The salts are very stable in acidic media, a property not possessed by many reducing agents.

Less well known, however, is the action of hydroxylamine as an oxidizing agent. This property has received little study, but it warrants your further investigation —particularly where oxidizing agents now used are not fully satisfactory.

For dyeing synthetic fibers.

Hydroxylamine sulphate is an ideal reducing agent in the cuprous ion method for dyeing synthetic fibers. One step in the process is the reduction of the cupric ion to the cuprous form, and hydroxylamine sulfate is reported to act as a reservoir for the cuprous ion as it is formed, thus avoiding precipitation of metallic copper which would result in dull colors. (It has also been reported that hydroxylamine acts directly on the fibers and makes them more easily dyed by direct wool dyes. It is possible that this process will soon displace the cuprous ion method when it has been more thoroughly evaluated.)

Shortstopper for synthetic rubbers.

The sulfate and chloride salts of hydroxylamine are used as non-discoloring shortstoppers in the production of butadiene-styrene rubber, GR-N-type synthetic rubber, and other polymers. In this use the hydroxylamine is added to inhibit further polymerization when the reaction has reached the desired conversion. The result, when hydroxylamine is used, is rubber with better color.

And reports from users indicate that CSC hydroxylamine salts have been, and are now being used, with *both* hot and cold polymerizations. What's more, their use is *not* confined to specialty rubbers, but they are also being used successfully with all-purpose synthetic rubber of the styrene-butadiene type.

The principal reason behind the increased use of hydroxylamine is the better color it produces in rubbers as compared with hydroquinone-stopped synthetics.

For synthesis.

The hydroxylamines are valuable for chemical synthesis of oximes, hydroxamic acids, and numerous intermediates—also for preparation of anti-skinning agents,

Physical Properties	HYDROXYLAMMONIUM ACID SULFATE	HYDROXYLAMMONIUM SULFATE	HYDROXYLAMMONIUM CHLORIDE
Formula	$NH_2OH \cdot H_2SO_4$	$(NH_2OH)_2 \cdot H_2SO_4$	$NH_2OH \cdot HCl$
Molecular Weight	131.11	164.14	69.50
Melting Point, °C	Indefinite	177*	152*
pH of 0.1M Aqueous Solution at 25°C	1.6	3.7	3.4
Solubility at 25°C, g/100 g solvent			
In Water	Approx. 390	63.9	94.7
In 95% Ethanol	4.3	0.2	10.5
In Methanol	20.2	0.1	17.5

*Melts with decomposition.

anti-rusting agents, and pharmaceuticals. For example, hydroxylamine reacts readily with aldehydes and ketones to give high yields of oximes which are useful in a variety of applications, including the preparation of antioxidants and stabilizers. When added to inks and paint, oximes are useful as anti-skinning agents.

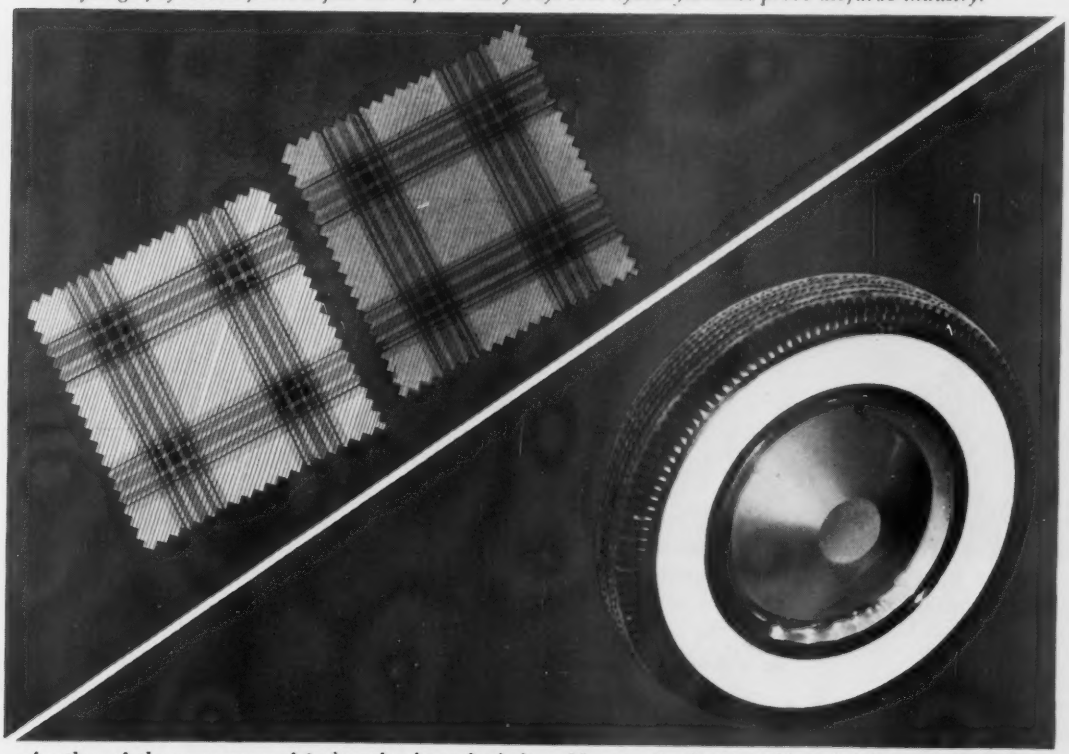
Effects on proteins and biological systems.

Hydroxylamines inhibit certain enzymes, such as catalase. Gelatin treated with hydroxylamine shows considerable resistance to acid etching. It also inhibits bacterial growth, and many of its derivatives have fungicidal properties. And hydroxamic acid, prepared from hydroxylamine, possesses interesting pharmacological activity.

Can hydroxylamines help you explore new fields within your field?

Most probably the answer is "yes." With their unique properties and wide range of utility—plus the fact that they are now available in commercial quantities at moderate prices – hydroxylamines possess unlimited potential. They offer you unlimited research and product development opportunity.

There is a difference in color when synthetic fiber (on left) is treated with hydroxylamine during dyeing. Dyeing of synthetic fibers is just one of the many ways that hydroxylamines prove useful to industry.



Another of the many uses of hydroxylamine salts is in rubber production to achieve brighter, clearer color.

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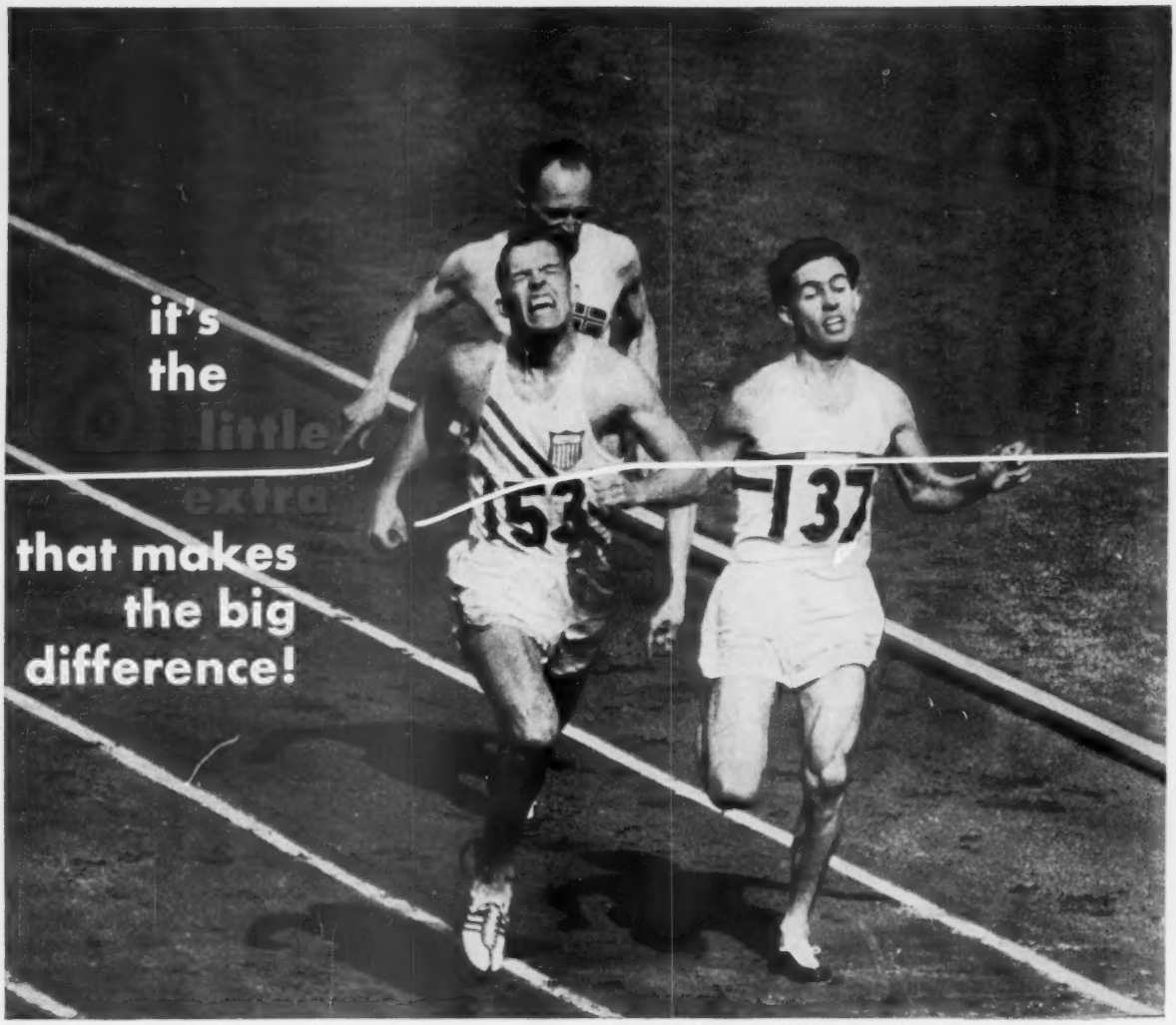
HYDROXYLAMINES



In a field of ten-second men, the all-important difference between victory and defeat is just a tick on the timer's stopwatch. In the rubber industry, it's the same way. Marbon Chemical, the pioneer in high styrene rubber reinforcing resins, constantly comes through with the added extras that make the big difference. Advantages such as a consistent high level of performance through rigid quality control, unsurpassed technical assistance, total reliability, complete research and development facilities, plus faster service through same-day shipments. Don't be satisfied with second-best. Go with the leader who is out front in the rubber resin field in every way—Marbon Chemical!

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As Ken Soule Sees It

by Kenneth J. Soule

More Ultrasonics

Last month, in this space, we had occasion to refer to an article on "Ultrasonics" by Walter Ian Fischman in *Better Homes and Gardens*. Mention was also made of some of the almost incredible results obtained by the use of the high pitched "sound waves" involved—which alternate from 20,000 to 30 million times per second.

When these super high speed waves are passed into a special type wafer of crystal, "the electrical energy is changed into physical movement," causing the crystal to pulsate. Then, if a number of these crystals are submerged in a tank or other container of water, the powerful shock waves are said to tear the water molecules apart. The multitude of tiny bubbles produced burst inward, rather than outward, causing a very potent scouring action. In a dishwasher, this almost magically removes every particle of dirt or food, (even lipstick or dried egg yolk), without the slightest damage to the most delicate of china. Since the bubbles are so minute, they can penetrate crevices difficult to reach in any ordinary way. Hospital cleaning of quantities of hypodermic needles is a case in point. Countless other involved cleaning jobs, such as automobile carburetors and watch works, may be completed in minutes without disassembling the unit.

Ultrasonic waves operate in air, as well as through water, and the results obtained are equally miraculous. A few examples will illustrate. Tough or inferior grades of meat can be tenderized easily and quickly and made delicious. Fog can be readily dissipated, (a blessing at airports). Air pollution units produce air *entirely* free from dust, dirt, pollen, etc. In medicine, ultrasound is being used in diagnostic work, to ease or cure the suffering of many types of deep-seated pain; it is also used in surgery. In operative work, ultrasonics is claimed to be so selective that it can "dissolve portions of the white matter of the brain, (where tumors form), without affecting the gray matter which controls bodily functions."

In industry, jobs which had previously been labeled "impossible" have now yielded to ultra sound. These include the welding of aluminum without distortion or the use of heat, and the drilling of all manner of simple or elaborate holes in exceptionally hard material. Strangely enough, the drill bit itself does not revolve—the abrasive wear is accomplished by particles of grit being bounced around by ultrasound waves. A modification of this method has produced a vibrationless (and nearly pain-free) dentist's drill.

One final example cited by Mr. Fischman comes close to being in the Jules Verne class. It is stated that through ultrasonics, "it is entirely possible to make cloth last almost forever. Coats could be handed down from father to son to grandson; a pair of socks could be worn and washed every day for twenty years without wearing out."

A very special vegetable fiber is at the heart of the wear-proof fabric described. It comes from a far-eastern plant called *"Ramie"*, and is said to be stronger than any other known fiber. Previously, it has found limited commercial use in gas mantles, ropes, nets, etc. The extreme difficulty of getting it free from the rest of the plant has prevented its potentials from being realized. Now that ultrasonics has solved this problem, a truly fabulous textile fabric is just a step away. So, while you may not be intrigued with the idea of wearing the same pair of socks for twenty years, we believe that a new and vastly superior fabric for use in belting, hose, packing, etc., may arouse your interest.

Smudge and Smear

Did you know that scientifically soiled fabrics are regularly available as a standard commercial item? No doubt the makers of soaps, detergents, and dry cleaning preparations are familiar with these unusual standard samples, but I doubt if many other technical people are acquainted with them.

As a bit in *Coen's* "Newsscripts" explains it, Foster D. Snell Inc. consulting chemists, makes a regular business of producing such accurately soiled fabric samples as a stock item, and in fact are at present enlarging their production facilities in order to keep up with the demand. When the fabric being treated is cotton, the dirtying-up mixture (which has been used since 1950) reads approximately as follows: carbon black 25 per cent; coconut oil 32 per cent; coconut oil fatty acids 16 per cent; mineral oil 16 per cent; Bentone 34, 10 per cent.

To prepare the samples, desized Indianhead fabric is given two passes through a chlorothene suspension of the above mixture, being thoroughly dried after each immersion. The goods are then lightly "scoured with 2-grain water," air dried, and cut into 4″ x 12″ swatches. Snell also prepares similar samples of wool and nylon.

Customer laboratories using these standardized specimens are generally interested in testing the cleaning power of various solvents, detergents, etc., and many use the reflectometer to measure the

effectiveness of their work. Snell, therefore, furnishes initial Hunter reflectometer readings with all samples.

Since super-active, pre-school youngsters seem to have a well-deserved reputation for soiling their clothes so quickly and so very thoroughly, it might be of scientific interest to take a few Hunter readings on representative samples of their clothing. Then, if they proved to be dirtier than the present standards, some real gum shoe work might be in order. Of course, if the children came out second best it would hardly be wise to let them know about it. It goes without saying that they unquestionably could easily get dirtier if they put their minds to it.

Perhaps, on second thought it would be much better to leave the kids *out* of this matter completely!

Blimps

In this day of faster-than-the-speed-of-sound air travel, either by jets or rockets, the slow, unglamorous Navy blimp has appeared to some people as a useless, outmoded relic. But to others, with slightly longer memories, the illustrious record of U. S. lighter-than-air craft in World War II is not so easily forgotten. In that conflict, blimps in our Atlantic seaboard squadron alone made a total of 56,000 flights and escorted 89,000 ships without the loss of a single vessel to enemy action. The entire fleet of blimps, operating from some 50 bases, carried out anti-submarine and escort duties in a 3,000,000 square-mile area in North and South American and European waters.

It was, therefore, quite a shock to hear on June 26th, that the Navy had issued to Capt. M. H. Eppes, Commanding Officer at Lakehurst, N. J., orders to begin the immediate suspension of all blimp control activities. Of the ten blimps now in active service, *eight* are to be put on the shelf by November 30, 1961, while the other two will remain in use, for research and development only, for a period of one year. The other activities at the Lakehurst Naval Air Station will continue. Among these are two fleet helicopter squadrons, and an R & D command involved in developing catapults and arresting gear for use on the newest type aircraft carriers. Also to be continued is the only Navy school for training meteorologists and parachute riggers, as well as a vital Naval Air Reserve Training Command.

The official reason given for the blimp discontinuance was the "shortage of funds and trained personnel." Further, it was said by the Navy that "these reasons are combined with the increased capabilities of helicopter and fixed-wing aircraft to perform all the necessary anti-submarine and airborne warning functions."

This may possibly be so, but one finds it hard to forget two things: (1) The Russians are said to have about 800 submarines and few surface vessels. (2) For tracking submarines for days (or even weeks) at a time, the blimp is *incomparably* better than the helicopter or any other defensive unit.

We devoutly hope that the Navy decision to ground the blimps was made after an unbiased study of all the pertinent facts. We further hope that inter-organization jealousy had no part in bringing it to pass and, finally, that its wisdom may never need to be tested in the tragedy of war!

Jet Powered Boats

The latest entries into the pleasure boat field have neither propellers nor rudders. They are driven by a jet stream of water sucked in through an intake screen on the keel and squirted out of a nozzle on the transom. Acceleration is powerful and instantaneous. Steering is accomplished merely by deflecting the jet stream, which permits short, rapid turns in complete safety. Similarly, the push of a button re-directs the water flow under the hull to bring about quick, full stops.

The speed boats embodying these innovations carry the name "Buehler Turbocraft," and are being built in this country by the Indiana Gear Works, Inc., Indianapolis, Ind. The water-propulsion device which makes them possible is the brain child of Bill Hamilton, a New Zealand inventor and industrialist. Technically, the Turbocraft jet unit consists of a three-stage axial flow turbine, powered by an inboard marine engine. A direct coupling turns the multiple impeller system. There are no reverse or reduction gears.

Besides the features already mentioned, the Turbocraft operates freely through less than three inches of water. (Incidentally, the water can be rough and rocky, since the boat's fiber glass hull is built to stand rough usage.) Also, with no propeller and no rudder, there is nothing under the hull to cause injury to swimmers and water skiers, or to be fouled by ropes or lines.

On paper, this jet powered craft sounds sensational. According to close friends who are "expert boatsmen," it out-performs all promises: it has little or no vibration, is very economical to operate, and has practically nothing that can get out of order. What are we waiting for? Anchors aweigh!

Flabby Americans

Some critics—both here and abroad—have been saying that Americans, in general, have become self-indulgent, spineless, soft, and supine. There may be a measure of truth in the criticism, although I have suspected that the remarks were based more on jealousy than solid facts. Now, two small straws in the wind cause me to wonder. No. 1 . . . The rash of expensive electric can openers. Presumably for those too tired (or lazy) to turn a crank, or wield a manual opener. No. 2 . . . An electric tooth brush and gum massager! Those who "can't brush after every meal" may now, no doubt, completely avoid the Herculean task of brushing. Just hold the gadget in your mouth (if you have the strength), and let the motor take over.

Shades of Thomas Edison and Teddy Roosevelt! What next? . . .

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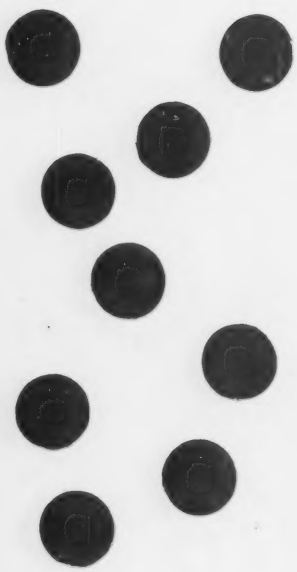

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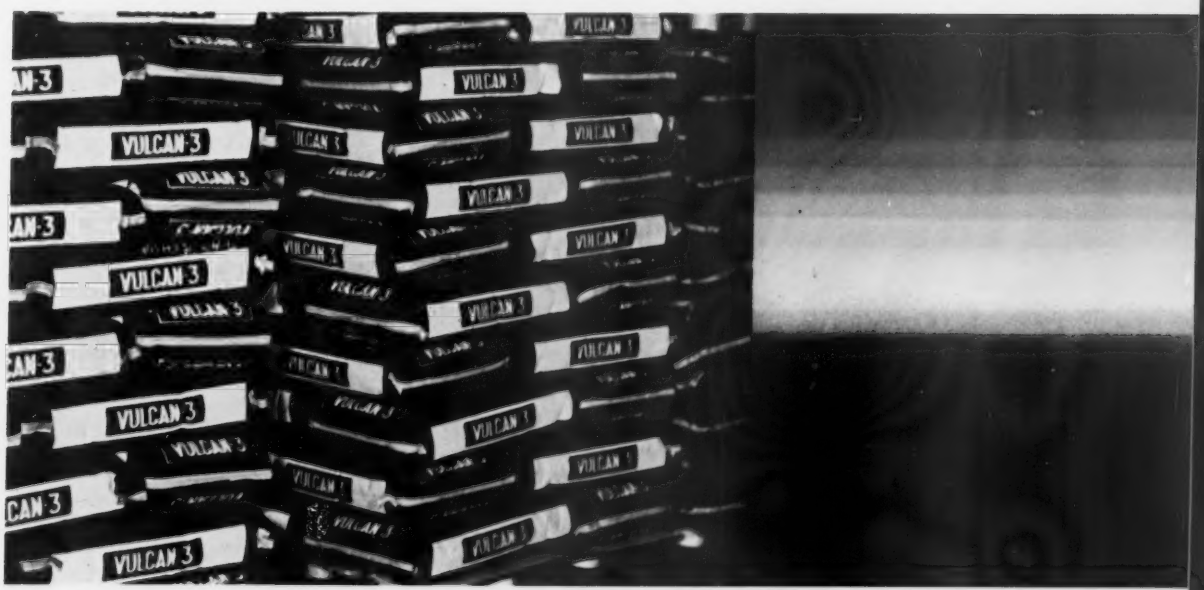

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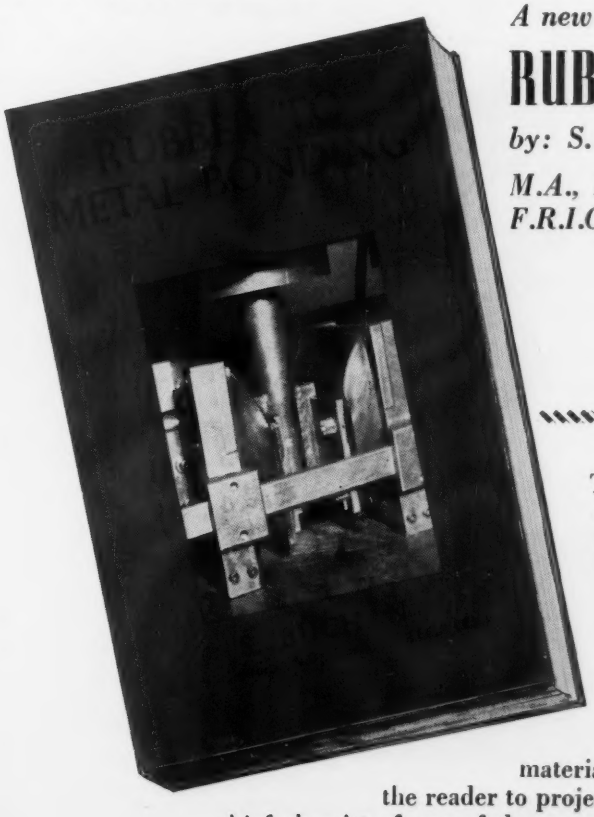

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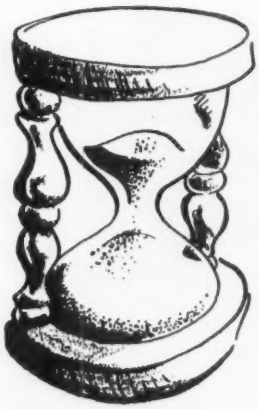

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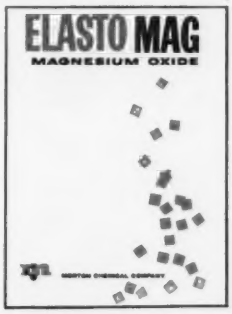

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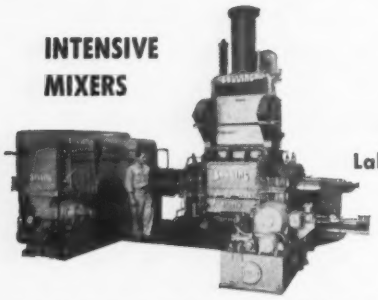

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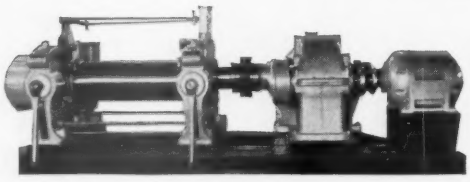

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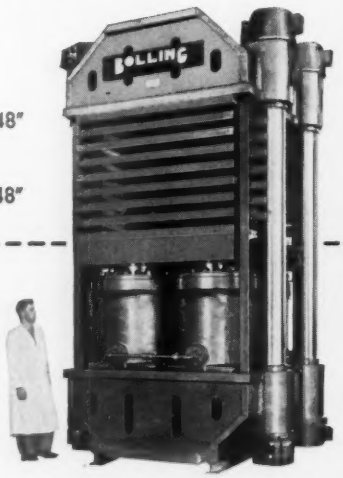

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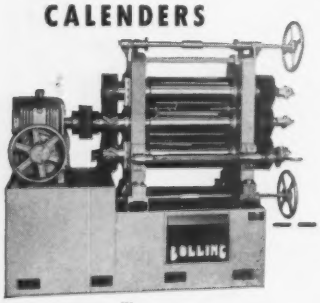

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3-roll	through
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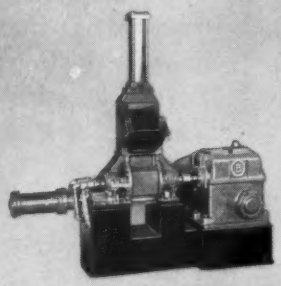

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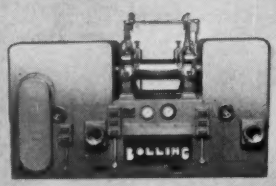

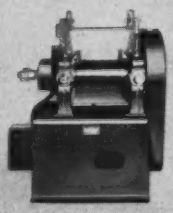

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• **Hungarian Tire Production.** Looking over some recently-published communist production figures, it is understandable why heretofore they have been very bashful about publishing figures, and have confined themselves only to increases expressed in percentages. Even a child knows that if you produce 1,000 units a year and you increase that amount during the following year to 2,000 units, that can be expressed in a growth rate of 100 per cent. If the exact figures are cited, however, then suddenly the soap bubbles of inflated and, in many cases, ridiculous statements, concerning the enormous productivity of this communist country, burst. In the April issue of the trade paper, *Plaste und Kautschuk*, published in Eastern Germany, the second Hungarian five-year plan is discussed. It is stated that the rubber processing industry expects to double its production by 1965. Besides the reconstruction of the largest Hungarian rubber factory, a new facility for the production of tires and technical rubber goods will be built.

Now we learn for the first time that in 1957 Hungary produced only 72,838 automobile tires; this figure increased within a year to 80,144 tires, and finally grew further in 1959 to reach 82,079 units. Under the five-year plan, the production figure in 1965 is expected to reach 195,000 pieces. As far as truck tires are concerned, a little better showing has been registered. In 1957, 211,162 units were produced; in the following year, this figure was increased to 219,038 pieces and, lo-and-behold, by 1959 the production figure had reached 231,086 units. Under the second five-year plan, they hope to manufacture 430,000 truck tires by 1965. Hungary also produces rubber conveyor belts. In 1957, the factories turned out 1,547 metric tons. In 1959, production amounted to 1,624 metric tons. The five-year plan visualizes an annual production by 1965 of 3,000 metric tons.

In order to show the discrepancy between communist and capitalist production, we would like to mention briefly that in 1959, the United States manufactured 102,637,000 passenger, and 50,238,000 truck tires. The new tire factory of the Continental Gummiwerke AG in Stoecken, West Germany, produces 23,000 passenger tires daily. That means that one factory in the capitalist world alone, the one in West Germany, is able to manufacture more automobile tires within four days than the Hungarians were able to turn out in the whole year of 1959.

• **Hungary Installs Chemical Equipment Out-of-Doors.** The climate of Hungary is similar to the weather endured in the state of New York. It gets very cold during the winter; heavy snows cover the Hungarian plains and mountains, and late fall and winter are particularly severe in some parts of the country. In some sections, it rains profusely. Taking these rather inclement weather patterns into consideration, one is startled and amazed to read in the March issue of our French contemporary, *Revue Generale du Caoutchouc,* that the Hungarian government has issued a decree to install a number of chemical equipment items in the open air. Cooling equipment, vulcanizing machinery, autoclaves, fermentation vats, heat exchangers, milling and mixing apparatus and a number of other pieces of equipment are to be used under these conditions. The reason given is the fact that it will be possible to reduce the cost of installing this equipment from 42 to 33 per cent.

Our capitalistic mind can find only three reasons for exposing very expensive machinery to the rigors of weather: First, Hungary is in a hurry to finish the installation as quickly as possible in order to resume manufacturing; the second possibility seems to be a shortage of cash to defray the cost of the buildings; and the third consideration might be that the Russian overlords do not want to invest too much money in this particular area.

• **The Mechanics of Ozone Cracking.** This subject was investigated by Messrs. M. Braden and A. N. Gent in an article recently published in our German contemporary, *Kautschuk und Gummi*. The article describes experimental measurements of the growth of a cut in a stretched rubber sheet in an atmosphere which contains ozone. A well-defined rate of crack growth is obtained, substantially independent of the applied tensile stress when this exceeds a critical value necessary for growth to occur at all. The rate of growth is found to be similar for a number of polymers and is principally determined by the ozone concentration when the mobility of the polymer molecules is sufficiently high. When the molecular mobility is inadequate, crack growth is retarded.

The critical condition is found to be similar for all the polymers examined, and largely independent of the conditions of exposure; it appears to reflect an energy requirement for growth of about 40 ergs/cm^2 of newly-formed surface. The effect of the

degree of vulcanization and the presence of additives, including antiozonants, on these two factors has also been examined. The dialkyl-p-phenylene diamines are found to confer protection by raising the critical energy required for growth to occur, in contrast to other protective agents which affect only the rate of crack propagation.

• **New Tire Factories Abroad.** The tremendous increase in the use of automobiles and trucks in all parts of the world has stimulated the building of many tire factories. The latest information emanating from Europe indicates that the Italian Michelin organization, Michelin Italiana-Sami, Turin, contemplates the construction of an automobile tire factory near Cuneo, Italy. At the beginning of operations, about 600 people will be employed there. . . . Yugoslavia contemplates constructing a factory in Obilic near Pristina, where about 400 people will be employed. The factory will produce all kinds of rubber articles and automobile tires. About 2.75 million dollars will be invested for machinery, equipment and the building. . . .From Poland comes word that a third tire factory will be built in Allenstein; it will go on stream some time during 1965 and will have an initial annual capacity of 400,000 tires. A year later, this production figure is slated to be increased to 2 million, and by 1970, its capacity is expected to reach 3.5 million tires.

• **Electric Pan-Europe.** Disregarding the cleavage of Europe into two separate units—the European Common Market and the EFTA, consisting of the seven states led by England—the electrical industry of Europe, without much fanfare, has created a central organization under the name of "Union Pour la Coordination de la Production et du Transport de l'Electricité" (Union for the Coordination of the Production and the Transportation of Electricity), with a central office in Switzerland. All electrical generating plants in Germany, Austria, France, Italy, Switzerland, Belgium, Luxembourg and Holland have agreed to cooperate by interchanging, supplementing, buying and supplying electricity according to regional requirements. The European press underscores the fact that this kind of organization has been achieved without the interference of any government or representative of the diplomatic world.

• **Cars and Trucks in the European Common Market.** According to the latest figures published in the bulletin of the statistical office of the European Community, the number of cars and trucks in the Common Market has increased from 11.25 million units in 1959 to more than 13 million in 1960. France accounted for 5.5 million, Germany, 4.1 million, Italy, 2 million, and the three Benelux countries, 1.34 million units. In 1960, all European Common Market countries exported 1,229,500 cars and trucks. Production of cars and light trucks in these six countries rose to 3.6 million units, whereas the total world production in the same period reached a total of 12.5 million units. In 1960, the six European countries forming the European Common Market produced 462,000 trucks, so that at present the amount of trucks in the European community amounts to 3.11 million units.

• **German Rubber Shoe Imports Increasing.** In 1956, Germany imported 157,526 pairs of rubbers; two years later, in 1958, 234,892 pairs were shipped to Germany; in 1959, imports rose to 539,869 pairs. This trend has continued, and in 1960 the number of imported rubber shoes totaled 685,108 pairs. A similar development has been observed concerning sports shoes having a vulcanized rubber sole. In 1956, imports of this type of shoe amounted to 982,971 pairs; since then, imports have risen by more than 250 per cent, and in 1960 reached 2,528,218 pairs. Because of the fact that the total of last year's imports equalled 60 per cent of Germany's domestic production, a number of German factories have already curtailed or given up production of these articles.

• **Exports of Austrian Rubber Products.** In 1959, Austria exported more than 600,000 tires at an estimated value of $4,000,000. In 1960, the amount of tires shipped to foreign countries rose to 900,000 units, at an estimated value of $6,000,000. The largest customer was Germany, followed by Sweden, Switzerland, Turkey, Belgium, Luxembourg, Norway, the Sudan and Thailand.

In 1959, tubes valued at $400,000 were shipped abroad. In 1960, these exports rose to $670,000. Again, Germany was the most important customer, followed by the U.S.A., Finland and the Netherlands. Sales to foreign countries of other rubber articles have also shown a very satisfactory increase.

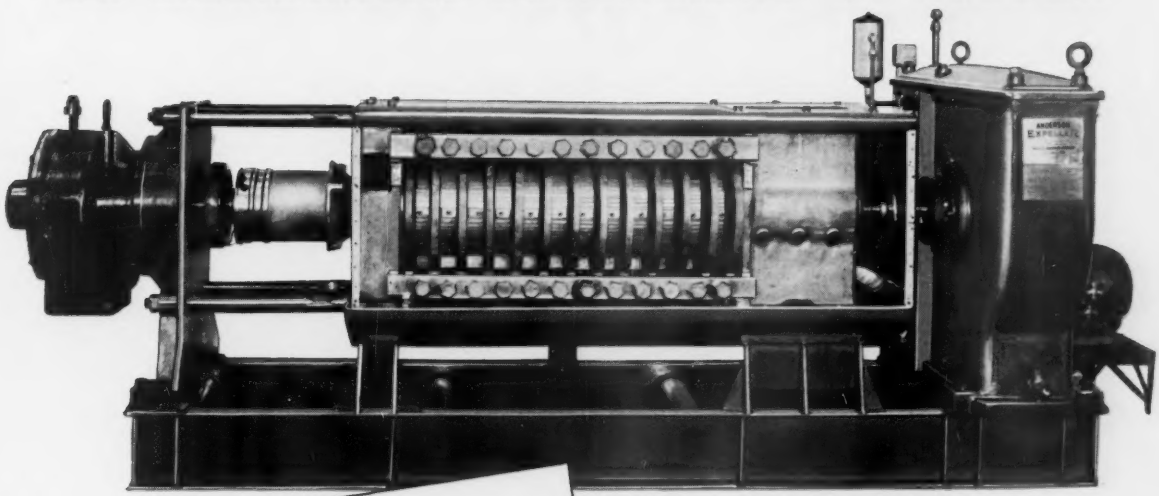
• **Rexall Drug and Chemical Co.** This well-known firm has just gained a foothold within the confines of the European Common Market. The concern is building a factory in Erembodegem in Belgium which will produce a number of rubber and plastic articles for domestic use. Production is scheduled to start this year, and about 500 people will be employed. The American company contemplates marketing its merchandise not only in the European Common Market, but also in the EFTA countries.

• **Pirelli in West Germany.** Pirelli, SpA., the well-known Italian rubber concern, has organized a company in Frankfurt under the name of Pirelli Vertriebs-GmbH, which will import and export the products of the Pirelli factory in Milan, Italy. The initial capitalization of the German sales organization amounts to $50,000.

EXPELLER* PROCESS

PROGRESS REPORT

ON MECHANICAL DEWATERING OF RUBBER



ADVANTAGES

- Increases Drying Capacity
- Agglomerates Minute Crumb particles
- Improves Carbon Dispersion
- Saves on Drying Equipment
- Reduces Dryer Dust
- Dewaters all Types of Natural or Synthetic Rubber
- Reduces Cost Per Pound of Dried Rubber

Mechanical dewatering of rubber by the new Expeller Process has been proved successful by the operation of 24 machines in eight leading rubber plants over the world. For example, the capacity of rubber apron drying equipment has been increased 1.5-2 times when proceeded by Anderson Expellers.

Results similar to those at the left are being obtained. Data are available and Pilot Plant demonstrations on your product can be arranged.

RESULTS

Material	% H_2O Wet Basis Product from Expeller	Dryer Capacity Before Use of Expeller	Dryer Capacity With Expeller
Non-Pigmented SBR	10-15	3500	6300
Oil Extended	12-17	5000	8000
Carbon Black Masterbatch	8-12	7000	9000-10,000

	% H_2O IN	% H_2O OUT	Expeller Capacity
Special Synthetic	55	6-12	7000 #

THE V. D. ANDERSON COMPANY
Division of International Basic Economy Corporation
1963 West 96th Street Cleveland 2, Ohio, U. S. A.

THE V. D. ANDERSON COMPANY
1963 West 96th Street • Cleveland 2, Ohio

Gentlemen: We are interested in the Expeller Rubber Dewatering Process. Would you please provide us with additional data.

We are processing (type of synthetic or natural rubber) _____

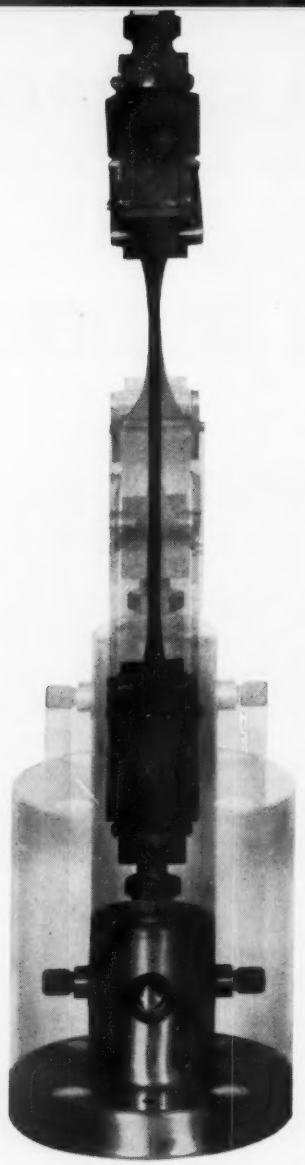
_____

Name _____ *Title* _____

Company Name _____

Address _____ *City* _____ *State* _____

*Trademarks reg. in U.S. Pat. off & Foreign Countries



Rubber has more stretch when it's formulated with Neville C-I® Resin

Test after test on the Instron has clearly shown the superiority of quality rubber formulations using Neville Coumarone-Indene Resins in place of competing products. Compounds with Neville C-I Resin repeatedly showed better elongation and tensile strength characteristics both before and after aging.

But stretch and strength are not the only advantages gained through the use of these resins. Their unique ability to impart plasticity brings many processing benefits. Mixing, milling, calendering and tubing will be faster and smoother, and cures will be more uniform. You'll obtain improved mold flow, better knitting and a thinner flash line. Also, these resins are economically priced and will effectively lower pound volume cost in highly loaded stocks while still retaining good physicals. They are available in flaked, solid or liquid form and in a wide range of colors from ½ to 16 Neville. Softening points are from 10°C. to 155°C. Write for further information.

Neville Chemical Company, Pittsburgh 25, Pa.

NEVILLE®

Neville Products

Resins—Coumarone-Indene, Hydrocarbon (Thermoplastic and Heat Reactive), Hydroxy • **Oils**—Plasticizing, Neutral, Rubber Reclaiming, Shingle Stain • **Solvents**—Aromatic (Refined and Crude), Semi-Aromatic (Refined and Crude). • **Antioxidants**—Non Staining Rubber • **High Purity Indene • Indene Derivatives • Crude Naphthalene.**

12686 12687 12707 13037

HOW TO MAKE NITRILE RUBBER JUMP THROUGH A HOOP

Here are four Durez phenolic resins that can help you get the properties you want in nitrile rubber compounds.

Durez 12687 helps you two ways. As you mill it into the rubber, it softens the stock to give fast, easy milling and rapid loading of filler. Then when the stock cures, the resin cures with it—adding tensile strength, flexural strength, hardness, and rigidity.

You get these results with just a *little* resin—as little as 20 parts per 100 parts of rubber, in a typical recipe. You control the properties by controlling the amount of resin you add.

At higher levels of addition, you can get a fast, complete cure without sulfur or accelerators. The resin gives all the reactivity you need to cure the rubber, often in record time.

Durez 12707 is a resin you'd use in compounds that tend to be scorchy. It cures more slowly. Stocks made with it are lower in hardness and tensile strength, higher in elongation.

Durez 12686 is one you can use on the Banbury without the least worry about scorching. It won't cure *at all* until you add hexa. Then it behaves just like **Durez 12687,** above.

Durez 13037 is similar to 12686 but is in liquid form. Its low viscosity lets you soften the stock still more, without strongly affecting end properties, to get still easier extruding and molding of highly loaded compounds.

This is a good resin for high-durometer stocks that you're laminating or building up onto fabrics, because the resin produces a residual tack at room temperatures which helps the plies stick together.

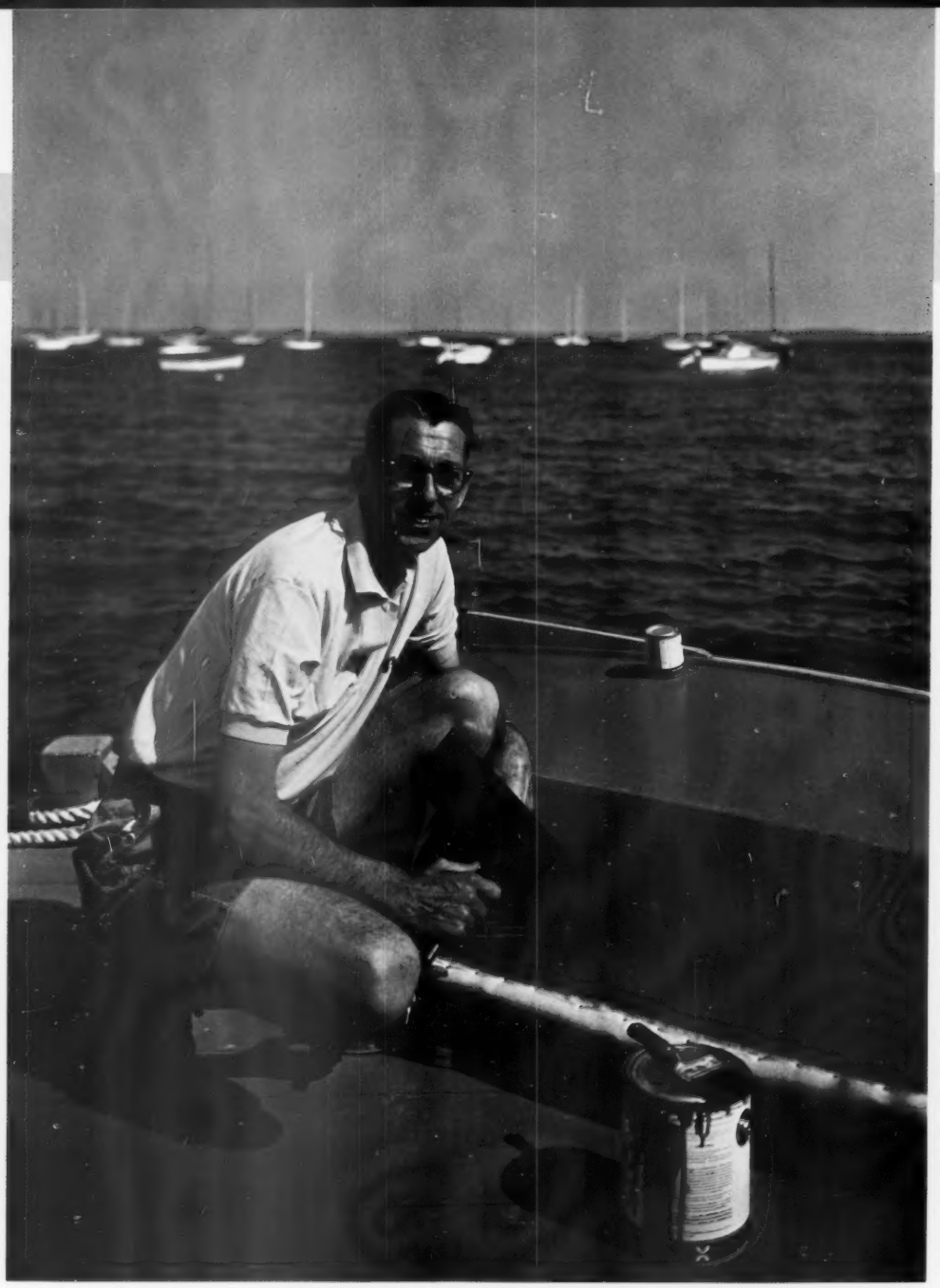
It is also an excellent modifier for nitrile-phenolic solvent cements, producing better residual tack and flexibility in many cements normally poor in tack.

There are a great many Durez resins you can use to put desired characteristics into nitrile rubber or SBR, natural rubber or neoprene, and to control the properties of solvent-type adhesives. To find out what these resins can do for you, write us.

DUREZ PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION, 108 WALCK RD., NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS



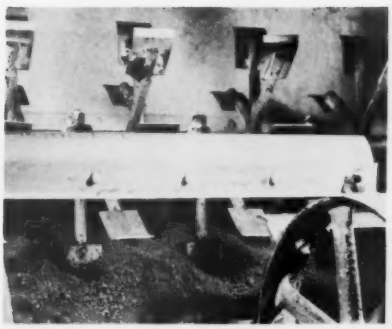
MEET ELIOT HOWARD— United Carbon district sales manager and an amateur yachtsman.

In boating, water is necessary—*outside the boat* but not in.

In manufacturing black masterbatch, eliminating the moisture is just as important.

ENSURANCE AGAINST MOISTURE

Drying—a function of time and temperature—is accomplished in this exclusive gas-fired drier *(the longest in the industry)* with temperature accuracy controlled to ± 1°F. BAYTOWN black masterbatch fully dried to the closest finishing tolerances in the industry assures customers of superior product performance.



Fully dried BAYTOWN black masterbatch as seen from the discharge end of the drier designed to the exclusive specifications of United Carbon. A series of stock breakers, similar to those shown here, within the multizoned drier turn the product over during the stepwise drying process to ensure optimum drying.

The new United-Barclay Process* has provided United Carbon with the means for producing the finest black masterbatch in the industry. Just one indication of the superiority of BAYTOWN black masterbatches is their consistently lower moisture content. In fact, these products have fewer impurities of all kinds.

The elimination of salt and other highly water soluble impurities found in brine is one of the most important advantages of the new process. In addition, the process affords proper control of coagulum and a reduction in fines which cause an obstruction in air circulation preventing the escape of volatiles during drying.

With the virtual elimination of impurities and moisture plus unique "wet" mixing, United Carbon consistently brings you the high-quality masterbatches you need.

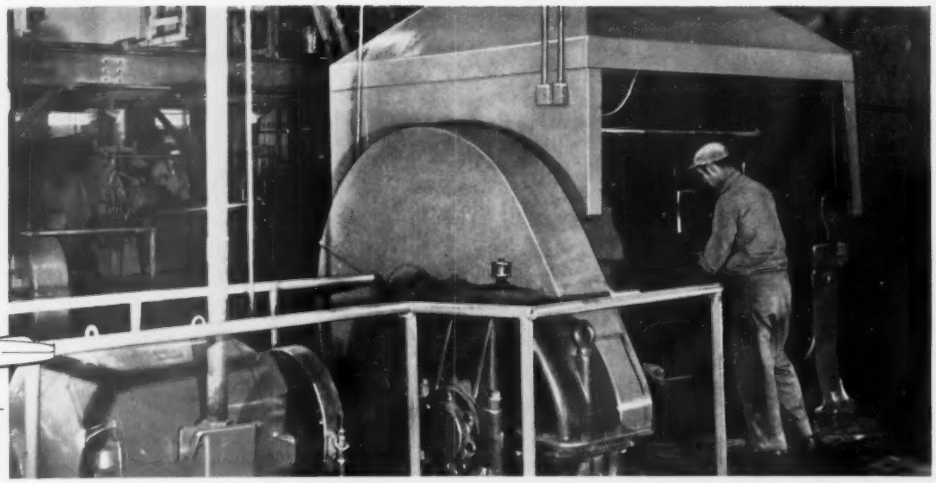
*Patents Applied For

BAYTOWN—The Birthplace of Black Masterbatch

For more information on the low moisture content of BAYTOWN black masterbatch, contact:

UNITED CARBON COMPANY, INC.
410 PARK AVENUE, NEW YORK 22, N. Y.
A Subsidiary of United Carbon Company
AKRON CHICAGO LOS ANGELES
BOSTON HOUSTON MEMPHIS
In Canada: CANADIAN INDUSTRIES LIMITED
In France: UNITED CARBON FRANCE, S.A.

UNITED CARBON



Serving the aircraft, automotive, appliance, business machine, electrical and agricultural industries, The H. O. Canfield Co., Inc. manufactures 5,500 different molded, cut and extruded rubber products in its plant at Clifton Forge, Virginia.

H. O. Canfield Finds Employees Adaptable, Eager to Learn in VIRGINIA

CLIFTON FORGE PLANT has tripled in size from 40,000 to 120,000 sq. ft. in seven years. Company executives say construction costs were favorable compared to Northern cities. Fine climate and recreational facilities of area have helped Canfield attract competent chemists and engineers.

MANY CANFIELD MACHINISTS were trained at a nearby technical school, operated under Virginia State Apprenticeship Training Program with cooperation of Virginia State Department of Labor and Industry. Canfield employees have even built some of the company's production machines.

Seven years ago The H. O. Canfield Co., Inc. — a leader in the rubber industry since 1888 — decided to relocate for more efficient production. Their choice: Clifton Forge, Virginia. Reasons for choice: ample electric power, a large water supply to meet their 1000-gallons-a-minute requirements, excellent transportation facilities, and employees who are both adaptable and eager to learn.

K. N. Carter, Vice President-Sales of The H. O. Canfield Co. says, "Because practically none of our production is of a standard nature, we required a labor force which could be trained to make constant changes in precision work techniques. In Virginia we found an abundance of such employees." Since the move to Virginia, employment has increased from 80 to 400 employees and Canfield now ships 15 to 20 million precision parts from its Clifton Forge plant each month. Find out how the production advantages of Virginia can benefit your business. Phone, wire or write . . .

C. M. NICHOLSON, Jr., Commissioner
Division of Industrial Development and Planning
Virginia Dept. of Conservation and Economic Development
Room 803-RA State Office Bldg., Richmond 19, Va.
Phone: MIlton 4-4111, Ext. 2255

Send for free case history brochure "Facts Favor Virginia for Your New Plant Location"

VIRGINIA
. . . a wonderful place to play or work

see Pennsalt for rubber chemicals

ACCELERATORS AND VULCANIZING AGENTS

METHYL THIRAM, ETHYL THIRAM—Versatile primary accelerators, activators, vulcanizing agents for Hevea, SBR, nitrile, butyl rubber. Retarders for Neoprene GN.

METHYL ZIRAM, ETHYL ZIRAM, BUTYL ZIRAM—Active ultra accelerators and activators for Hevea, SBR and nitrile, especially for latex and wire compounds.

ETHYL SELERAM—Extremely active ultra accelerator for continuous vulcanization wire compounds and butyl rubber.

ETHYLAC®—Primary accelerator for Hevea, SBR and nitrile compounds. Provides good scorch time and rapid vulcanization. Excellent delayed action activator for thiazoles and sulfenamides, in both Hevea and SBR compounds.

DIPAC®—Sulfenamide-type primary accelerator for natural and SBR rubber. Exceptionally long delayed action followed by rapid vulcanization.

VULTAC®—Vulcanizing agents and resinous-type plasticizers for a variety of Hevea, SBR, nitrile and Hevea-SBR blend compounds.

ANTIOXIDANTS

PENNOX® A—Alkylated diphenylamine general purpose antioxidant for dry rubber and latex.

PENNOX® B, C, D—Nonstaining, non-discoloring hindered bisphenol antioxidants for Hevea and SBR vulcanizates and raw SBR polymer.

For compounding data and more detailed descriptions, write for a copy of our 40-page Rubber Chemicals Catalog, S-156.
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PENNSALT CHEMICALS CORPORATION,
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See our complete listing in Chemical Materials Catalog

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THE RUBBER FORMULARY

STARTER SET $250

There is no single service that offers greater value to the manufacturer of rubber goods, or to any laboratory or organization concerned with rubber compounds, than THE RUBBER FORMULARY. This monthly service has been supplying compounders with detailed, practical information on almost every type of rubber compound for the past twelve years, serving the rubber industry in very much the same manner the pharmacopoeia serves the pharmaceutical industry.

THE RUBBER FORMULARY is sold on an annual subscription basis (by calendar year) and is issued in monthly shipments of cards, so designed as to make it possible for the user to locate and select formulas meeting specifications for hardness, elongation, tensile range etc., in a matter of minutes. Annual subscriptions are available at $95 a year.

FOR THE BENEFIT AND CONVENIENCE OF THE ENTIRE RUBBER INDUSTRY . . .

THE RUBBER FORMULARY is making available for the first time a STARTER SET. This contains 2365 rubber compounds selected from the more than 9100 published in the FORMULARY in the years 1948 through 1957 inclusive. Selections have been made to give the best condensation for practical purposes . . . eliminating obsolete compounding materials and closely similar compounds, keeping those on which the most properties are reported.

Like the RUBBER FORMULARY, the STARTER SET utilizes a punched card system of recording and classifying compounds. Individual filing cards are provided for the compound. Notches and imprints on the edge of the card serve for the classification and indexing of each compound. They are so designed that every compound is classified according to the principal physical properties, according to the type of rubber hydrocarbon, and as to whether or not the compound contains carbon black. Additional space is provided so that the user can add his own classifications.

CONTAINS:

2365 rubber compounds on individual punched cards presorted first by polymer, then each polymer grouped into black and nonblack subgroups, further subdivided by hardness and then by tensile.

115	compounds	for natural rubber, black
154	"	for natural rubber, nonblack
276	"	for styrene rubber, black
150	"	for styrene rubber, nonblack
259	"	for nitrile rubber, black
97	"	for nitrile rubber, nonblack
254	"	for neoprene, black
116	"	for neoprene, nonblack
101	"	for butyl, black
57	"	for butyl, nonblack
50	"	for polysulfide, black and nonblack
36	"	for reclaim (all black compounds)
45	"	for Hypalon, black and nonblack
86	"	for silicone rubber, black and nonblack
92	"	for vinyls (all nonblack compounds)
100	"	for miscellaneous other rubbers, black and nonblack
156	"	for blends of general purpose rubbers (natural, styrene, butyl, reclaim), black
71	"	for blends of general purpose rubbers, nonblack
77	"	for blends containing oil-resistant rubbers, black
73	"	for blends containing oil-resistant rubbers, nonblack
2365	compounds	Total

PRICE $250 for the set.

USE THIS CONVENIENT ORDER COUPON

DATE .....

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Gentlemen:

☐ Please send me ( ) of the new RUBBER FORMULARY STARTER SET @ $250 for each set.

☐ Please enter my subscription to THE RUBBER FORMULARY, effective with the January 1961 issue, at $95.00 per year.

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SILICONE NEWS from Dow Corning

Cut Rejects; Lower Costs!

CUTS REJECT RATE . . . giant tires release easily and surface details are perfect . . . no costly reject problem here thanks to heat-stable Dow Corning Silicones.

For the Rubber Industry . . . In other areas of the rubber industry too, Dow Corning Silicones have proved to be time and money savers—as electrical insulation for mill and mixer motors; as anti-adhesive coatings for bags, containers and interleaving; as heat-resistant paints that also resist weathering and corrosive atmospheres; as lubricants for ball bearings; and as Silastic® gums and bases for compounding silicone rubber stocks to meet severe requirements. Write for more information.

Dow Corning Silicone Mold Lubricants Assure Quick, Clean, Easy Unloading

Recent field reports indicate more and more tire molders are standardizing on Dow Corning silicone release agents to assure perfect performance every time. That means clean release without sticking; sharp surface details . . . tires that look their very best.

Economical to use, these silicone mold lubricants cut mold cleaning time down to almost nothing and at the same time increase mold service life, keep rejects to a minimum, and speed production. Applying Dow Corning silicone mold lubricants is a snap . . . spray into intricate grooves, or wipe onto smooth surfaces.

Whatever the fabrication problem—from releasing green tires to lubricating Bag-O-Matic bladders—there's a Dow Corning silicone lubricant that's effective, economical and easy-to-use. Available in different forms, too: water-dilutable emulsions, solvent soluble fluids, greaselike compounds, stable dispersions.

EASILY APPLIED . . . Dow Corning silicone mold lubricants can be sprayed easily to reach tiny openings, and assure clean, easy release.

You can't find better release agents for rubber and plastic products than Dow Corning Silicones. Get more facts now. Write Dept. 8620.

first in silicones

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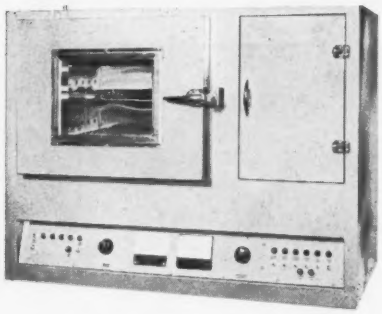
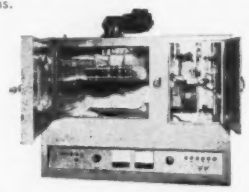


Orec 0300 Series employ an *electronic-chemical loop feed back servo system to achieve and precisely maintain chamber ozone concentrations.



Orec 0300 with Dynamic Stretching Apparatus.
*patent pending

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Types, grades and blends
for every purpose, wherever
Vulcanized Vegetable Oils
can be used in production
of Rubber Goods —
be they Synthetic, Natural,
or Reclaimed.

A long established and proven product.

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Represented by **HARWICK STANDARD CHEMICAL CO.**
Akron, Boston, Chicago, Pico Rivera, (Cal.), Trenton, Denver
Albertville, (Ala.), Greenville, (S. C.)

how to vastly increase the useful life of rubber...

Consider the effect of your curing system on the effectiveness of a chemical antiozonant

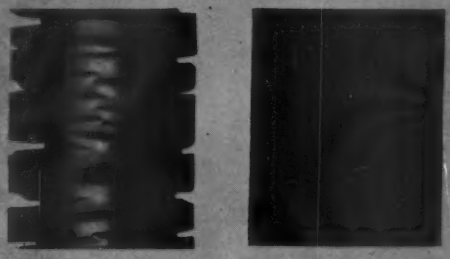
In compounding rubber, use of a potent antiozonant like UOP 88 or 288 is essential in assuring maximum crack-free life. But do you realize what a vast difference may be made by your *curing system?*

Look at the two rubber test strips illustrated. Both were formulated with UOP 88 . . . but note how much more effectively the antiozonant worked when accompanied by this change in curing systems —a vast increase in resistance to cracking!

Help in achieving maximum effectiveness from UOP 88 or 288 antiozonants is available through UOP facilities and technical personnel. Just write or telephone our Products Department.

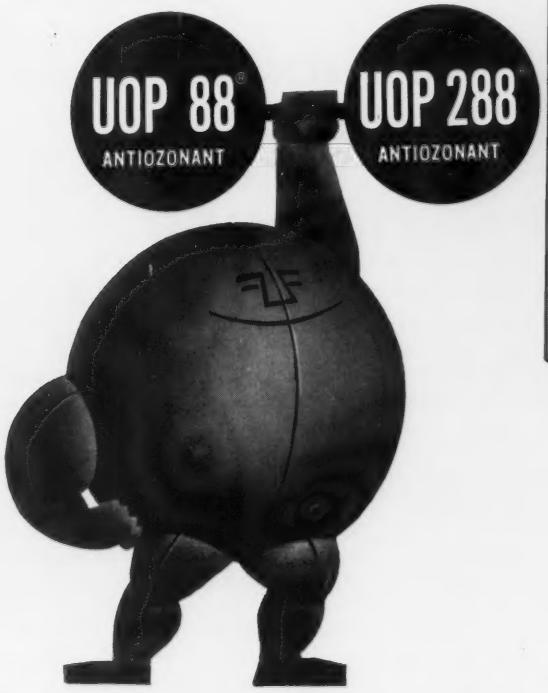
UOP ozone cabinets provide test conditions at a wide range of ozone concentrations.

The SBR specimens below were exposed to ozone at 100°F with 20 percent elongation for 52 hr. at 33 pphm ozone, then 187 hr. at 63 pphm ozone.



Carbon black—HAF (high abrasion furnace), Curing system—4 phr tetramethylthiuram disulfide; Hours to first crack—7 to 23.

Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 1 phr N-cyclohexyl-2-benzothiazole sulfenamide. No cracks in 239 hr.



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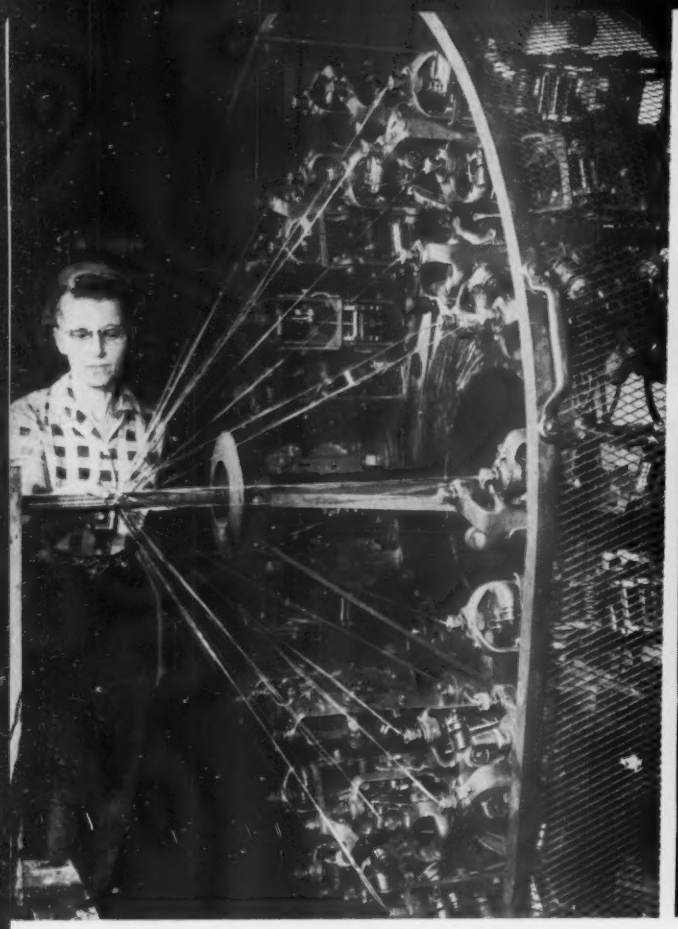
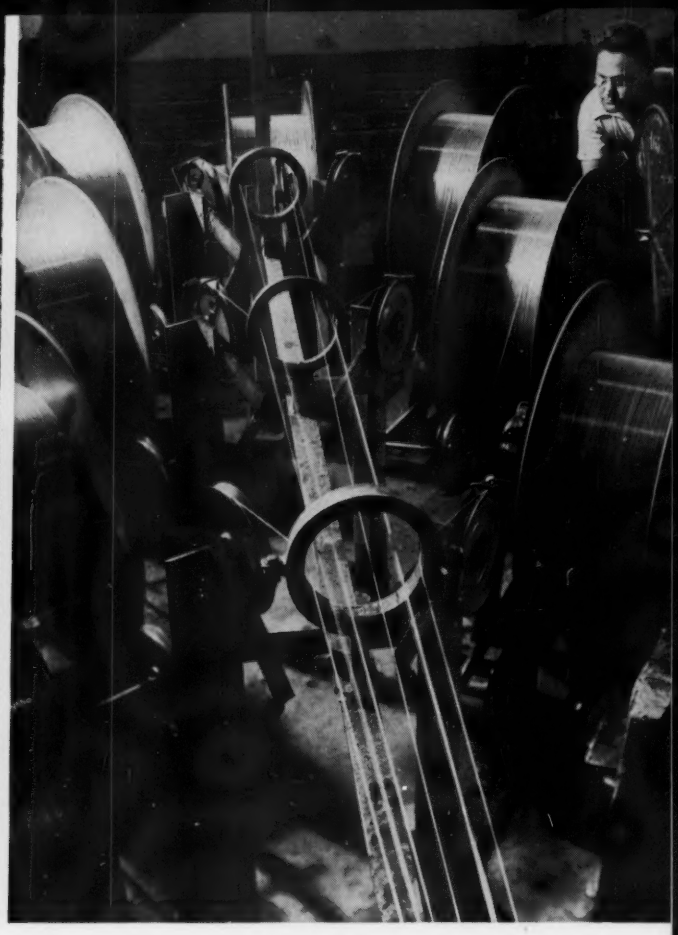
UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U. S. A.
WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW



B. F. Goodrich Company braids multiple strands of steel wire into intricate sinews around rubber tube to help control and resist tremendous internal pressures required of flexible hydraulic hose. Wire such as supplied by Johnson has tensile strengths ranging from 240,000 to 400,000 psi.



Firestone Tire and Rubber Company uses only high tensile steel wire of exacting tolerances in building tire beads. Rapidly entering the bead machine in parallel —three to fifteen wires wide, depending on strength specified—the wires are coated with rubber. Clean bronze finish on Johnson wire assures proper rubber adhesion.

The best names in rubber use Johnson wire for strength and safety in tires and hose

The rubber industry has a sound reputation for producing quality products in advance of its needs by use of imaginative research—painstaking development of production methods—careful selection and testing of component materials.

Goodyear—Firestone—U.S. Rubber—B. F. Goodrich—Thermoid and others have established their names over the years by giving the general public and industry alike—strength, safety and durability in products such as long lasting pneumatic tires and tough pressure hose.

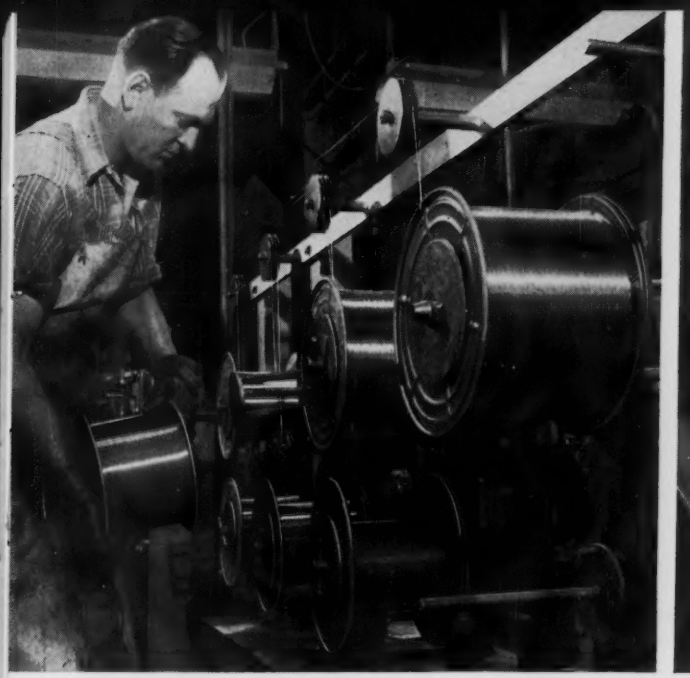
These two products owe their strength in part to the fine steel wires hidden inside them. For it is high-carbon steel bead wire which gives a pneumatic rubber tire—no matter what its size or job, the strength demanded by modern vehicles. Similar wire gives pressure hose its strong sinews which enable it to withstand working pressures as high as 10,000 psi—bursting strength may be three to four times as great.

Take the case of tire bead wire which Johnson supplies to every major tire manufacturer in the country. It is precision-drawn from special high-carbon rods to .037″ in diameter with a tolerance of only .002″—so fine that a 750-pound reel contains 39 miles of wire. Yet, a single strand exceeds 290 pounds of breaking strength equal to a tensile strength of 270,000 psi.

Also the wire must present a clean, unbroken surface and have a good and uniform bronze finish. This finish makes possible tight adhesion between the wire and the rubber surrounding it.

All these qualities contribute to the tire bead strength, help assure the safety of those who ride for work or pleasure on pneumatic tires.

Another special wire made by Johnson for the rubber industry helps rubber hose contain enormous pressures demanded by modern industrial applications. This reinforcing wire is drawn from selected high-



Thermoid Division, H. K. Porter Company, has cut wire rewind loss to ½ of 1% by use of Johnson Discard-a-Spool which eliminates overlaps and tangles, protects wire quality in shipment. The one-way disposable spool weighs only 28 ounces vs 200 ounces for standard spool—slashes tare weight 14 times.

United States Rubber Company wires tires for strength on this bead building machine. The strength comes from the steel wire bead in the edge of each tire. Johnson makes special high-carbon steel wire—.037″ in diameter with tolerance of only .002″ for U.S. and other major tire companies.

carbon steel in diameters ranging from .008″ to .020″ and has exceptional dimensional accuracy—tolerance is plus or minus .0005″.

Johnson hose reinforcement wire is supplied with a special liquor finish to provide maximum adhesion of steel to the rubber which fills the interstices between braids.

The wire is uniformly cast to make possible even spooling and has uniform tensile strength to prevent breaking under the working tension.

These excellent wire qualities, plus careful packaging and prompt delivery, have resulted in Johnson becoming a prime supplier to the rubber industry for hose reinforcement wire.

The outstanding performance of Johnson wire in the rubber industry is typical of the experience in other industries where Johnson supplies aircraft cord wire, armature binding wire, wire for brushes, metal stitching, preformed staple wire, bobby pin wire, rope wire, oil tempered and MB hard drawn spring wire, and music spring wire in a wide variety of sizes and finishes.

If you use specialty wires, call one of the offices listed to right and explore the advantages of Johnson quality which combines strength with economy.

The Goodyear Tire & Rubber Company finds that Johnson meets their exacting requirements for tire bead wire which has high tensile strength, twisting strength, elongation and special surface finish. Here parallel tire bead wires uncoil evenly into a bead building machine.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

a subsidiary of **Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

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Chicago	Dayton	Houston	New York	Tulsa
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Steel

Looking for an end to the agonizing difficulties caused by late solvent shipments and contaminated solvents?

Switch To Skellysolve!

Why go on the warpath when contaminated solvent or late shipments slow down production? It doesn't help. And it's so much easier just to switch to Skellysolve. You'll find that Skellysolve is as pure as Pocahontas' kiss . . . and Skellysolve travels to you faster than an arrow from a brave's bow. Proof? Read this:

Skellysolve is pure because it's quality-checked during production and before shipment. Then, to keep out all contaminants, we make sure Skellysolve pumps, loading lines, storage tanks and tank cars are used *only* for Skellysolve.

Skellysolve is delivered fast because your order is phoned direct to the Skellysolve plant. No time wasted there! And nine out of ten cars are shipped the day after we receive the order. Any questions?

Call LOgan 1-3575, Kansas City, Missouri, and ask for Les Weber. He can supply the answers to any questions you may have. And he can also see that a shipment of Skellysolve is heading down the iron trail to you *tomorrow!*

Skellysolve for Rubber and Related Industries

SKELLYSOLVE-B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor, in dried compound. Closed cup flash point about —25° F.

SKELLYSOLVE-C. For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve-B. Closed cup flash point about 13° F.

SKELLYSOLVE-H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve-C is desired. Closed cup flash point about —16° F.

SKELLYSOLVE-L. For general manufacturing operations where a medium evaporation rate is required. Closed cup flash point about 12° F.

SKELLYSOLVE-R. For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency. Closed cup flash point about —25° F.

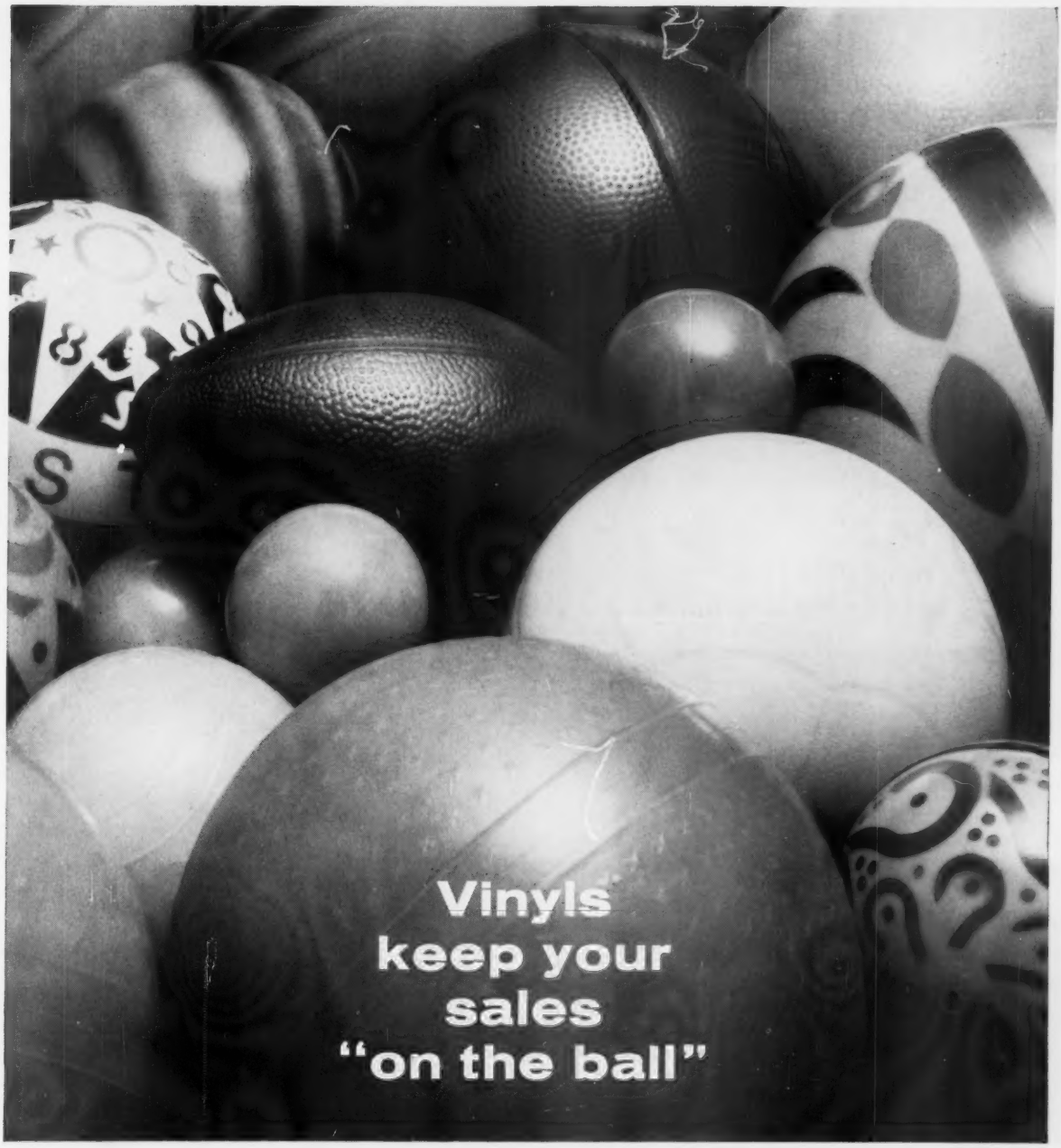
Ask about our
Skelly Petroleum Insoluble Grease

SKELLY

Skellysolve

SKELLY OIL COMPANY

Marketing Headquarters
Kansas City 41, Missouri



Basketballs, footballs, alphabet balls—all kinds of inflated vinyl playballs . . . and all of them are made of plastisols based on BAKELITE Vinyl Dispersion Resin QYNV. Produced by National Latex Products Company, these tough, scuff-free vinyl products are non-oxidizing and unaffected by prolonged exposure to water.

National Latex, a pioneer and leading producer of vinyl playballs, uses QYNV exclusively. They report that "With QYNV's low emulsifier content there is less danger of exudation. Using QYNV we can be sure of consistent viscosity and long-term viscosity stability."

Plan now to find out how BAKELITE Vinyl Dispersion Resins can improve the quality and sales appeal of *your* products. Write Dept. IY-124H, Union Carbide Plastics Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto 12.

UNION CARBIDE PLASTICS

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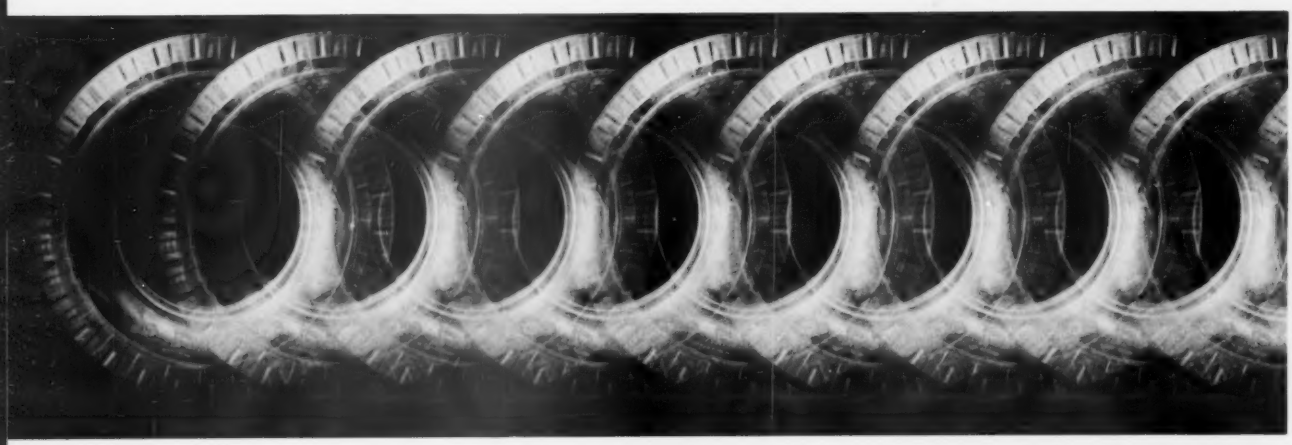
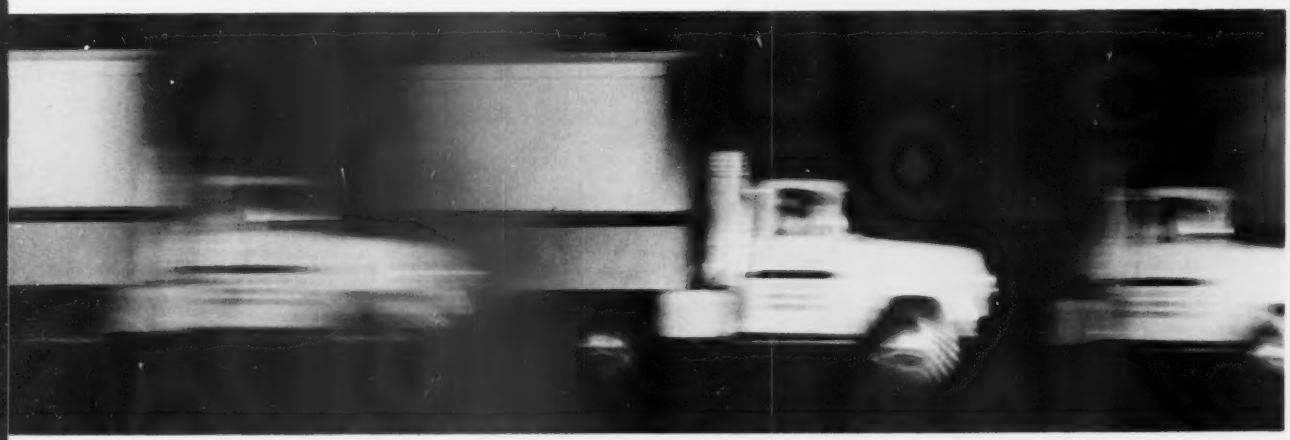
You get lower compound costs



Your customers get better tread



With Phillips Revolutionary new

PHILLIPS 66

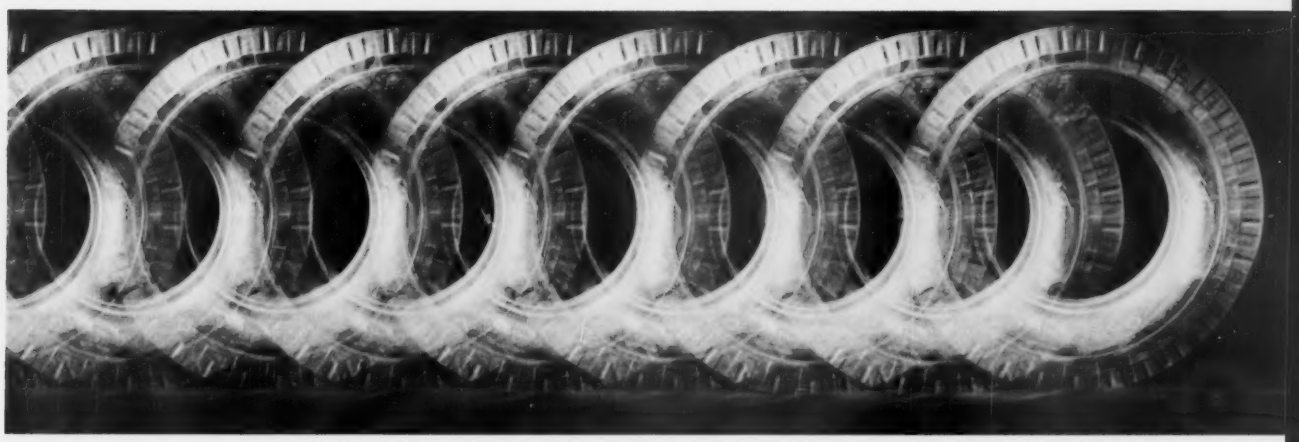
CIS-4 RUBBER, proved in over 3 million miles of road tests—

now in full production at Phillips Borger plant. Order your shipment of Cis-4 Rubber today—for low compound costs, improved tire performance.

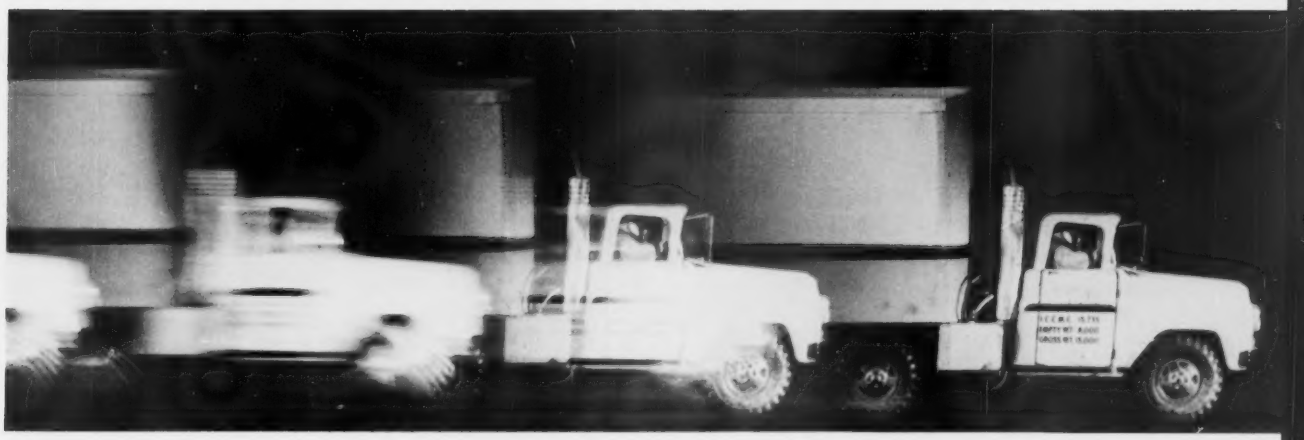
PHILLIPS CHEMICAL COMPANY

Rubber Chemical Sales Division, 318 Water St., Akron 8, Ohio. Sales Offices: Akron, Chicago, Dallas, Providence and Trenton. **West Coast:** Harwick Standard Chemical Co., Los Angeles, Calif. **Export Sales:** Phillips Petroleum International Corporation, Sumatrastrasse 27, Zurich 6, Switzerland. Distributors of Phillips Chemical Company Products, 80 Broadway, New York 5, N. Y.

tire after tire after tire



wear mile after mile after mile



—CIS-4* RUBBER

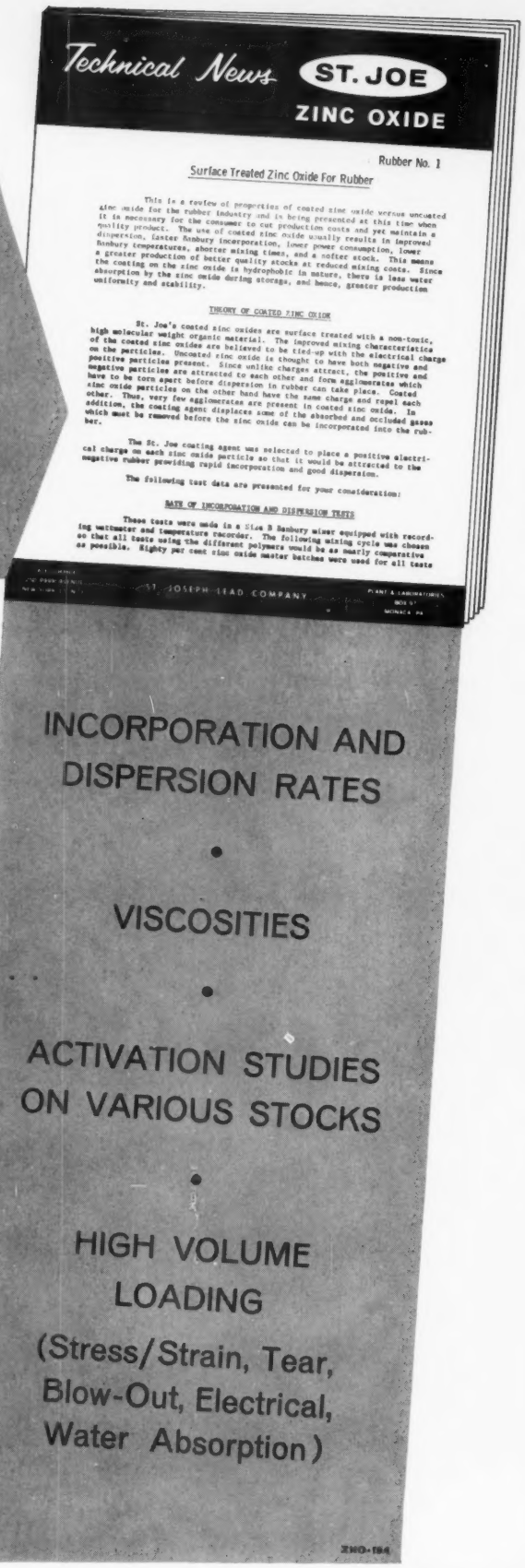
Here it is . . . Cis-4, the amazing new synthetic from Phillips Chemical Company. Extensive road testing and compounding proved: Cis-4 gives low compound costs, plus more tread miles per dollar.

Cis-4 has a unique capacity for tolerating high oil levels. Improved processing can be obtained through the use of selective oil and black combinations.

*A trademark

Another Example Of St. Joe's Technical Service To The Rubber Industry

Free Research Data On A ST. JOE Way To Reduce Your Processing Costs



Here, for the asking, are ten pages of test data which show precisely how St. Joe coated zinc oxide can improve quality and reduce your mixing costs.

Test showed St. Joe coated ZnO gives rapid dispersion, faster Banbury blending, less power consumption, shorter mixing time, softer stock and less water absorption. Report includes comparative test results on . . . . . .

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LEAD-FREE ST. JOE ZINC OXIDE

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1962 RUBBER RED BOOK

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Publication Date October 1961

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PRICE $15.00

Problem: Improve low temperature properties of sponge

Solution:

FIRESTONE TECHNICAL SERVICE AND *Diene*

When car dealers complain to the factory about car doors that leak cold and moisture, you can guess who's in trouble . . . the rubber compounder who supplies the door seals. In this case, cold weather was sapping the resiliency of his sponge, making it hard and brittle.

To solve the problem, Firestone Technical Service suggested a blend of other rubbers and *Diene**, Firestone's remarkable new polymer. Diene rubber restored low temperature resiliency to the compound *and* added far greater resistance to wear, heat, cracking and aging.

For that matter, whenever Diene is blended with natural or synthetic rubber, the resulting compound often gains qualities that surpass the best features of both.

Truck tires of Diene-natural rubber, for instance, show greater wear resistance, lower operating temperatures and improved road-grip on slick surfaces.

If you have a problem that may concern synthetic rubber, why not call on Firestone, the world's most experienced manufacturer of high-quality synthetic rubbers. Your Firestone Technical Service Man will be happy to assist you, or you may write Dept. 23-6 for information.

Firestone's Diene rubber plant is in full commercial production

SYNTHETIC RUBBER & LATEX CO.
AKRON 1, OHIO

MAKING THE BEST TODAY STILL BETTER TOMORROW

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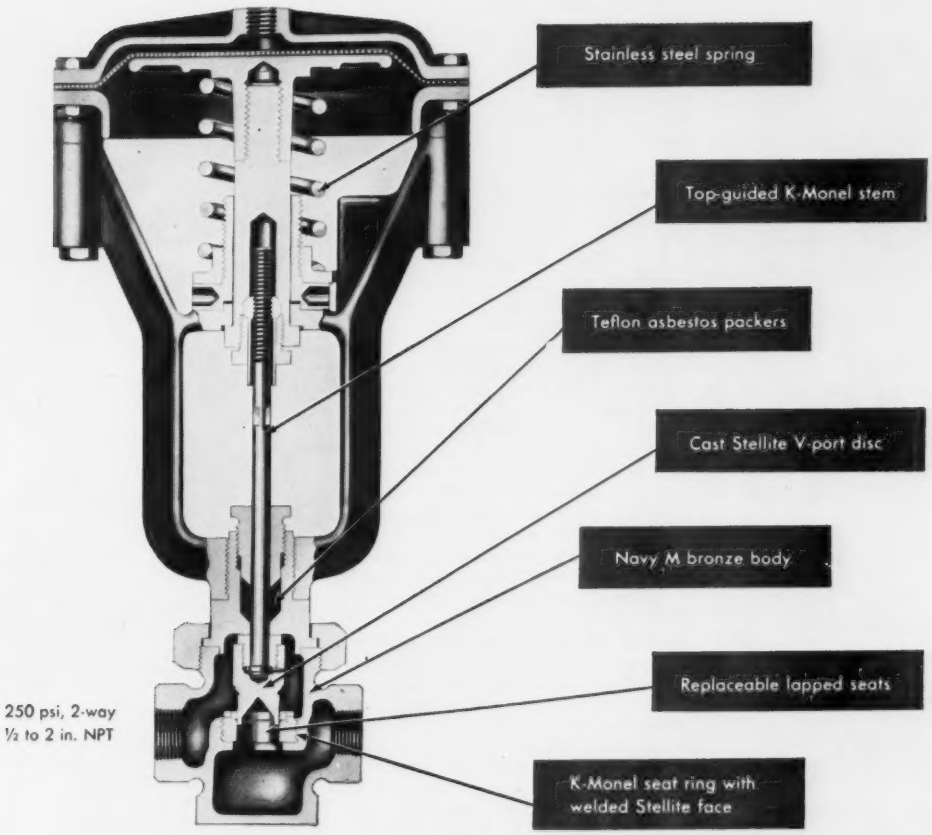
*A Firestone trademark for synthetic rubber

SINCLAIR-COLLINS® V-PORT VALVES



. . . for precise control of pressure or temperature . . . steam, hot or cold raw water service

Sinclair-Collins' V-port valves offer a solution to your temperature or pressure modulation problems. Designed for instrument actuation, they offer variable metering to provide extremely accurate and consistent control of media flow rates. Highest quality materials and Sinclair-Collins' precision manufacturing methods assure long, reliable service life, with minimum maintenance downtime. Stainless steel trim resists corrosion . . . Stellited seat ring and port disc resists wire drawing and cutting. Find out how S-C V-port valves can meet your control needs . . . a call to your near-by Sinclair-Collins Field engineer will bring prompt application engineering recommendations.

For more information write for free Bulletin SC-59. Address: Sinclair-Collins Valve Company, Akron 9, Ohio, Dept. RA-861

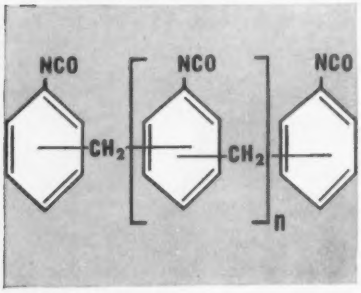
The SINCLAIR-COLLINS VALVE Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)
AKRON 11, OHIO

8117

papi®

(Polymethylene polyphenylisocyanate)



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High strength at ultra low density PAPI polyether fluorocarbon based foams for refrigerator insulation.

HOT STRENGTH

PAPI based rigid polyester foams **retain** their strength after prolonged exposure to temperatures above the useful range of conventional urethanes.

EXCELLENT ADHESION

PAPI provides **excellent adhesion** between butyl, nitrile, haloprene, and other rubbers and a variety of substrates like polyester fiber, nylon, metal.

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PAPI is a nonvolatile reactive isocyanate that is easily used even for spray-in-place foams.

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Please send more data on PAPI.

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Letters to the Editor

Comments continue to arrive on our editorial on the ACS Division of Rubber Chemistry which appeared in the June, 1961 issue of this publication. Here are additional representative remarks:

Realistic Eye . . .

Dear Sir:

I was happy to see some reaction, both pro and con, concerning your editorial. Hospitality suites, I feel, should be reviewed with a realistic eye. Some type of "Suppliers Hospitality Headquarters," with well-defined opening and closing times may be the answer. This will avoid interference with technical sessions. Accommodation for such quarters varies, of course, with the size of the headquarters hotel, location of a suitable room, etc., but I feel it should be tested some time rather soon, lest some management member from a consumer might sometime attend, and witness certain orgies both in entertainment and refreshment so prevalent at recent meetings.

Many of those from technical divisions are never required to spend a dime for meals, entertainment and other convention diversions during an entire session—not even so much as a breakfast as enterprising representatives are always on the prowl in hotel coffee shops. Banquet tickets are passed around with reckless abandon, and rumor has it that now even transportation costs to and from home base are underwritten in some instances.

Many of these expenditures, of course, can never be proven, but certain convention practices ought to be reviewed with a critical eye. Our company itself has been the subject of much criticism . . . but I have reason to believe that we would go along with any substitute set-up.

Certain officers of the parent society that I know have been most critical of certain phases of the Division of Rubber Chemistry (activities). Some self-policing should be the order of the day before ACS takes official action.

Some of us may be called to account by our respective companies who have every reason to feel that most of the hospitality suites are getting out of hand. They can recall when cheese and crackers, peanuts and pretzels constituted the refreshments and when a junior salesman doubled as bartender. Now, the suites put to shame any enterprising Brooklyn delicatessen; with solicitous liveried bartenders, waiters and other attendants.

Occasionally, when meetings are held in larger metropolitan centers, and the local rubber companies let out at 5:00 P.M., word travels far and wide of the sumptuous repasts available to all comers, washed down with vintage whiskies, without so much as an inquiry as to the identification of a guest.

I know that these guests often are in doubt as to the identity of their hosts. But who cares—the food and drinks were free. Even when the host's identity was established, many of the guests were without knowledge as to the supplier's products.

NAME WITHHELD

England, too . . .

Dear Sir:

May I say how much I agreed with your editorial of June, 1961. These are matters which affect us over here in a similar way and I have drawn the special attention of the Institution of the Rubber Industry and the Plastics Institute to the article.

M. Jones
Imperial Chemical Industries, Ltd.
Hertfordshire, England

What is Wrong?

Dear Sir:

. . . and what is wrong with meeting with one's friends and associates at Rubber Division meetings? Your editorial is much too strong on the subject and almost suggests that something illegal or immoral was going on. It seems to me that these things tend to equal themselves out over the years. I entertain those who entertain me, and I don't see that there is any wrongdoing involved. Surely, you know that this is the way a lot of business is conducted. I suggest you give more thought to the matter.

SALES REPRESENTATIVE

DON'T tell your wife . . . or complain to the neighbors . . . tell us! So long as it is pertinent to the rubber industry, we would be delighted to hear from you—at any time—on any subject. Something about this issue you like—or don't like? Get it off your chest. Address the editor:

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RUBBER PRODUCTS ARE MORE COLORFUL...THANKS TO COLUMBIA-SOUTHERN CHEMICALS

Today's rubber goods come in a full range of colors. Manufacturers know that bright, rich colors add sales appeal, give products an extra push. Modern chemistry makes colorful rubber items possible by providing white reinforcing pigments—Columbia-Southern Hi-Sil,® Silene® and Calcene®—that permit the addition of a kaleidoscope of color to the rubber stock. ¶ In addition to chemicals for the rubber industry, Columbia-Southern Chemicals include such basics as chlorine, caustic soda, soda ash, solvents and other chemical materials used in just about every processing industry. Investigate the use of these quality materials for your operation and find out why so many leaders like working with Columbia-Southern Chemicals.

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DISTRICT OFFICES: Boston · Charlotte · Chicago · Cincinnati · Cleveland
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Pittsburgh · San Francisco · St. Louis · IN CANADA: Standard Chemical Limited

Names in the News

Henry Robbins has been appointed plant manager of the New Ripley, Miss., unit of the American Biltrite Rubber Co., Inc.

Gene A. Brost, formerly midwestern regional manager, has been appointed product manager for intermediates at Antara Chemicals, a division of General Aniline & Film Corp., New York, N. Y.

Louis P. Bosanquet, graduate student of the University of Tennessee, has been awarded the 1961-1962 FIER-Foxboro Fellowship in Instrumentation by the Foundation for Instrumentation Education and Research.

David R. Fulton Sr., formerly sales manager of the Tire Valve Division of the Bridgeport Brass Co., Bridgeport, Conn., has been named vice-president of tire valve operations.

William F. Gerrow, Jr. has joined the executive staff of the Charleston Rubber Co., Charleston, S. C., as assistant director of marketing.

F. Scott Godron, head of market research at Victor Chemical Works, Chicago, Ill., has been elected president of the Chemical Market Research Association.

Roy H. Marston, Akron, Ohio, district sales manager for the Columbian Carbon Co. will head the Commerce and Industry Division in the 1961 United Fund-Red Cross joint campaign.

Coleman F. Hogan, a director of the Davidson Rubber Co., Dover, N.H., has been elected president of the company, succeeding **Virginia P. Dee,** who will continue to serve as treasurer.

Joseph E. Quinty, previously sales representative in Chicago, Ill., for Emery Industries, Inc., has been appointed assistant sales manager of the company's Organic Chemical Division, located in Cincinnati, Ohio.

B. K. Meuller, formerly associated with Mitchell Rubber Products, Inc., has joined the Kirkhill Rubber Co., Brea, Calif., as a chemist.

Kurt F. Richards, formerly a technical editor in the Butyl Division of the Enjay Chemical Co., New York, N. Y., has been assigned to the Chemical Raw Materials Division as a product coordinator.

Garth O. Greer, senior stores auditor for the Firestone Tire & Rubber Co. of Calif., received a diamond-set service pin and $100 check in recognition of his 25 years of service with the firm.

J. E. Trainer, executive vice-president of Firestone Tire & Rubber Co., Akron, Ohio, has been selected as one of the top ten "bosses" in the country by the National Secretaries Association.

W. Gerald Wilson, formerly senior analyst of international affairs for the B. F. Goodrich Co., Akron, Ohio, has been named manager of market planning for the company's International Division. **Henry P. Stockbridge,** formerly vice-president of Young & Rubicam, Inc., has been named to the newly created position of director of new product planning.

John L. Collyer, chairman of the executive committee of the B. F. Goodrich Co., Akron, Ohio, has been awarded the U. S. Mint Medal, highest decoration the U. S. Treasury Department can confer, for his success in selling U. S. Savings Bonds for ten years.

E. J. Thomas, Chairman of the board of the Goodyear Tire & Rubber Co., Akron, Ohio, recently celebrated his 45th anniversary with the company. **Robert B. Anderson,** former U. S. Secretary of the Treasury, has been elected a director of Goodyear. **Robert Lane,** director of public relations at Goodyear, has been elected president of Sigma Delta Chi, professional journalism society.

Samuel L. Madorsky has retired from the Polymer Structure Section of the National Bureau of Standards, Washington, D. C., after more than 31 years of government service.

A. G. Treadgold, vice-president of manufacturing of the United Carbon Co., Houston, Texas, has been elected treasurer of the company.

RUBBER PRODUCTS ARE MORE COLORFUL ... in the pages of BUSINESS WEEK

The colorful advertisement shown on the opposite page appeared in recent issues of *Business Week* and *Wall Street Journal* —total circulation over 1 million. Business and financial leaders were exposed to this message about the rubber industry, sponsored by the makers of the *white* reinforcing pigments—Hi-Sil, Silene and Calcene. May we help you look into the sales possibilities offered by colorful rubber products? Our district offices are listed on the facing page. Chemical Division, Pittsburgh Plate Glass Co.

NEW N-S HOSE WIRE PACKAGE

STEP 1

Hose wire reels are inserted in egg-crate container lined with a polyethylene bag.

STEP 2

A dessicant is added to absorb moisture and air is evacuated from the bag. The bag is then vacuum sealed.

STEP 3

Container is covered and steel-strapped to a non-returnable pallet for greater protection in transit and ease of handling.

GIVES GREATER CORROSION PROTECTION

Now you can store hose-reinforcing wire longer without fear of corrosion that would weaken the wire and rubber bond. National-Standard engineers have developed a new polyethylene packaging system that does the job for you.

Spools of hose wire are inserted between egg-crate-like cardboard partitions in a corrugated container, lined with a polyethylene bag. A silica-gel dessicant is added to absorb moisture in the bag, the air is evacuated, and the bag is sealed. The container is covered and steel-strapped to a non-returnable pallet.

In one test, hose wire packaged in the new National-Standard container showed no corrosion whatever after six weeks inside a humidity chamber. Vacuum-packed bead wire, first introduced by National-Standard over three years ago, has proved the value of this packaging technique.

ANOTHER NATIONAL-STANDARD FIRST in the field of wire-in-rubber development, the new hose wire vacuum package becomes a significant addition to the long list of N-S contributions to the rubber industry. Whenever you have a wire-in-rubber problem, let National-Standard put this experience to work for you. For additional information, write National-Standard Company, Niles, Michigan.

R-61-1

NS
NATIONAL-STANDARD COMPANY

NATIONAL-STANDARD COMPANY

Niles, Michigan

Here it is!

The most important book on rubber since Davis & Blake's "Chemistry and Technology of Rubber"

THE APPLIED SCIENCE OF RUBBER

Edited by W. J. S. Naunton

1192 Pages 5¾ x 9 Inches Illustrated

Published in England

Price: $32.50

Includes contributions by these noted experts . . .

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- R. N. Thomson
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Covering these topics . . .

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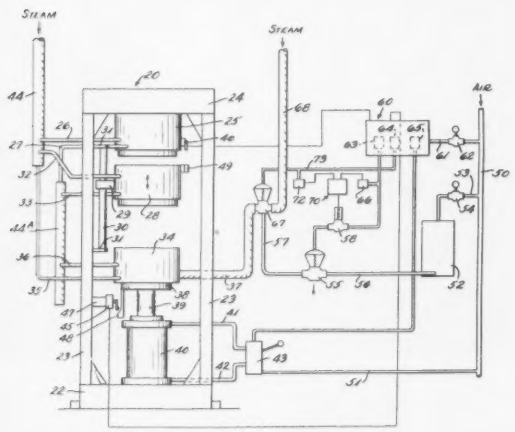
PATENT REVIEW

by Melvin Nord

Manufacture of Rubberized Fabric Articles

U. S. Patent 2,955,325, issued October 11, 1960, to Ralph C. Davis and assigned to the Firestone Tire & Rubber Co., relates to the shaping and vulcanization of single convolution air spring bellows suitable for use in the suspension system of a vehicle.

It has been found that blistering and other defects attributable to faulty shaping and curing of a single convolution air spring bellows can be



avoided if the shaping fluid is applied in a predetermined sequence or cycle, involving the precise use of a pulsating pressure—sufficient to progressively distend the preparation into contact with the forming surfaces of the mold—rather than a substantially unvaried pressure such as has been known heretofore in the art. Immediately following shaping, the curing fluid is also applied in a precise manner so as to further prevent the occurrence of blistering and other defects. The figure shows a view of a molding apparatus or "press" with the controls, piping and electrical wiring being shown schematically

Emergency Tire

U. S. Patent 2,950,751, issued August 30, 1960, to Calvin M. Bolster, Joseph P. Kaenan, and Paul O. Pfeiffer, assigned to the General Tire & Rubber Co., relates to an emergency tire for automobiles and other vehicles, using pneumatic tires which can be mounted upon deflated tires to permit the vehicle to be driven to a service station or other place where the damaged tire can be conveniently removed and repaired. The emergency tire of the present invention is in the form

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PATENT REVIEW

of a fabric-reinforced inflatable tube that is molded and vulcanized, or cured, to a transversely flat form so that it can be readily placed in a position encircling the tread of a deflated pneumatic tire.

The emergency tire has a tread portion that serves as a restraining band for the inflatable tube when the emergency tire is positioned on the deflated vehicle tire. The emergency tire, except for the tread portion, is readily expansible under inflation pressure, but is reinforced with fabric in such a manner as to permit its expanding in a radial inward direction, but resist transverse stretching. The substantially inextensible tread portion and the fabric reinforcement of the tubular wall enables the emergency tire to apply a relatively great radial inward thrust to the tread portion of a deflated tire throughout its circumference.

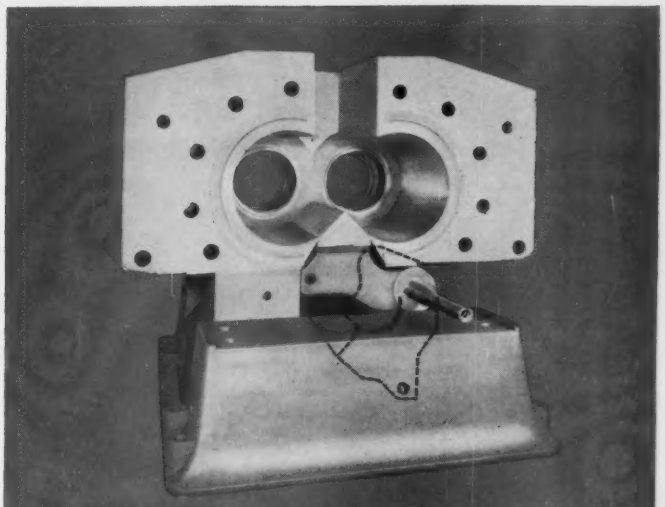
Modified Tread Construction for Tires

U. S. Patent 2,960,138, issued November 15, 1960, to Guiseppe I. Chiodo and assigned in part to Robert E. Burns provides a tire having a relatively thick tread portion having grooves in an outer layer and circumferentially extending cavities in an inner layer. The outer portions of the cavities extend outwardly beyond the roots of the grooves. The grooved outer portion of the tread provides a road gripping surface when the tire is new. The underlying cavities provide a softer tread so that a larger area of the tire comes into contact with the road and the pressure of the tire on the road is more uniformly distributed. The resulting lower unit pressure reduces the rate of wear. Moreover, the internal cavities provide a cooling effect so that the operating temperature of the tire is reduced. When the tire becomes worn to the point where the bottoms of the groove are reached, the rubber outside the aforementioned cavities is worn through so that the cavities become exposed as grooves and define new road gripping surfaces. Hence instead of becoming smooth, the tire has a second life.

Halogenated Rubbery Copolymers

U. S. Patent 2,958,667, issued November 1, 1960, to Lawrence T. Eby, Delmar L. Cottle, and Theodore Lemiszka, assigned to Esso Research & Engineering Co., describes an improvement in the process for the manufacture of halogenated rubbery copolymers of 85 to 99.5 weight per cent of a C_4 to C_8 iso-olefin and 0.5 to 15 weight per cent of a C_4 to C_{14} multiolefin.

The halogenated copolymer is contacted with an aquenous medium to form an aqueous slurry



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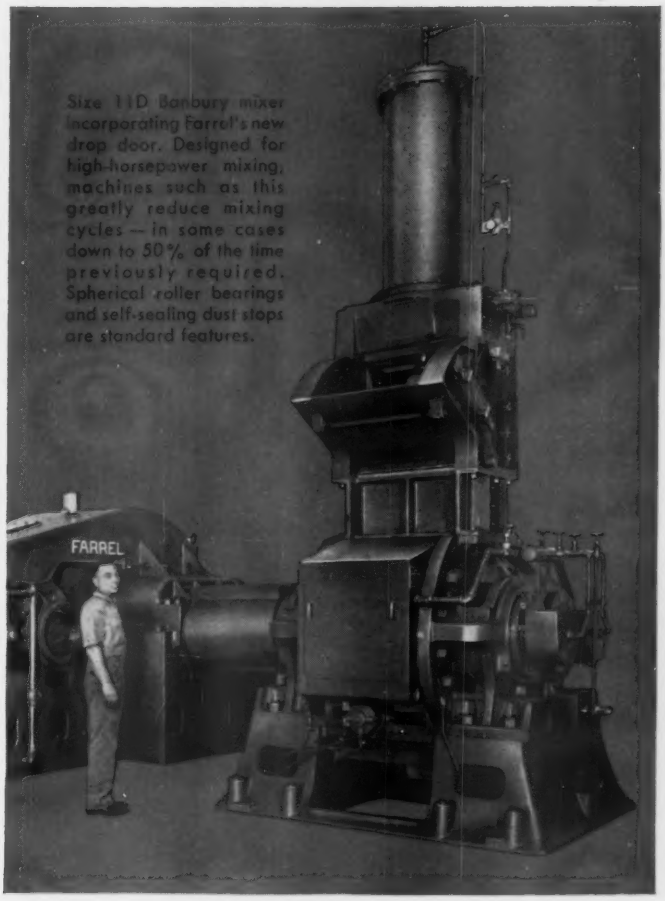

Size 11D Banbury mixer incorporating Farrel's new drop door. Designed for high-horsepower mixing, machines such as this greatly reduce mixing cycles — in some cases down to 50% of the time previously required. Spherical roller bearings and self-sealing dust stops are standard features.

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PATENT REVIEW

containing 0.01 to 10 weight per cent of a stabilizer consisting of an alkaline earth metal salt of a C_5 to C_{30} monocarboxylic fatty acid. The halogenated copolymer thus formed is dried. Thus, not only is the aqueous slurry stabilized against agglomeration of halogenated copolymer particles, but also the halogenated copolymer is further stabilized against scorching and prevulcanization during drying.

Silica Reinforced Rubber

U. S. Patent 2,964,457, issued December 13, 1960, to Gerard Kraus and assigned to Phillips Petroleum Co., provides an improved cured rubber stock. A blend of 100 parts of gum rubber (natural or certain synthetics) and 20-150 parts of colloidal silica is made, and this blend is irradiated by exposure to high energy radiation having energy at least equivalent to X-rays for a prescribed period. The irradiation cures the blend.

Other Patents of Interest

Subject	Assignee	Patent No.	Date
Tire for use on ice and snow	Pirelli S. p. A.	2,953,181	9/20/60
Pneumatic tire	Cleveland Trust Co.	2,953,183	9/20/60
Pneumatic tire building apparatus	Cleveland Trust Co.	2,953,186	9/20/60
Stabilized silicone elastomers	Union Carbide Corp	2,953,543	9/20/60
Preparation of modified rubbery copolymers	Esso Research & Engineering Co.	2,953,549	9/20/60
Elastomeric thread	U. S. Rubber Co.	2,953,839	9/27/60
Metal stabilizers for rubber	Monsanto Chemical Co.	2,954,356	9/27/60
Method for assembling rubber threads into ribbons	B. F. Goodrich Co.	2,954,815	10/ 4/60
Apparatus for making tires	Cleveland Trust Co.	2,954,818	10/ 4/60
Polyurethane foams coated with a polyurethane elastomer	E. I. du Pont de Nemours & Co.	2,955,056	10/ 4/60
Vulcanizing chlorinated isoolefin-polyolefin copolymers	Esso Research & Engineering Co.	2,955,102	10/ 4/60
Bromination of butyl rubber	Esso Research & Engineering Co.	2,955,103	10/ 4/60
Tire folding method	Fairchild Engine & Airplane Corp.	2,955,635	10/11/60
Dual pressure tire	William T. Gray	2,955,636	10/11/60
Profiled tire tread splicing	B. F. Goodrich Co.	2,955,640	10/11/60

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The raw materials required and the end-product itself jointly determine the degree of dispersion required to achieve an optimum balance between quality and cost

Incorporation and Dispersion of Compounding Ingredients

By I. DROGIN

Vice-President, United Carbon Co., Inc., New York 22, N. Y.

IN considering the incorporation and dispersion of ingredients in rubber, the finished product and the raw materials must first be taken into account. This involves the rubber and compounding ingredients, their physical and chemical properties, the type of mixing equipment employed, processing techniques used, the degree of dispersion required in the final product, and whether or not achieving optimum dispersion is necessary and the cost warranted.

The extent of dispersion sought will depend upon the final product produced. In mats, for instance, dispersion is not a factor; in tires, good dispersion is deemed essential. On the other hand, in certain industrial rubber products, such as engraving gums, rubber covered rolls, aircraft hydraulic hose, i.d.—o.d. tubing, weather stripping, etc., a higher degree of dispersion than that obtained in tire manufacture is prerequisite to meet desired standards.

Experience has shown that various rubbers and compounding ingredients do not wet to the same degree, and that pigments, fillers and rubber chemicals vary considerably in their ease of incorporation and dispersibility. With fillers which are low in colloidal particles and which function principally as loading materials rather than reinforcing agents, a high degree of dispersion is not essential and is often not attempted.

It is recognized that good dispersion is an important factor in obtaining good physical properties. How then should one proceed to incorporate compounding ingredients in various rubbers and achieve a satisfactory degree of dispersion?

Let us first consider what a compounder of rubber products has to incorporate and disperse. Broadly speaking, he uses different grades of natural rubber, various types of synthetic rubber, reclaim, and blends of these rubbers. In addition, he also can use butadiene-styrene latex black masterbatches containing different types of black and oil at various loadings. He also uses reinforcing pigments, such as carbon black ranging from super abrasion furnace, SAF, with very fine particle size, to medium thermal, MT, with coarse particle size; certain fine particle precipitated chalks; hard clays, regenerated clays; zinc oxide; hydrated silicon compounds, including calcium silicate and silicon dioxide; filler type pigments (soft clays, ground whiting, etc.); softeners; antioxidants; antiozonants; activators; curatives; peptizers; retarders; and colorants, all of which are listed in Table I.

Satisfactory dry pigment incorporation of ultrafine particle size carbon blacks, such as SAF and ISAF, is difficult to attain. The difficulty has been overcome by dispersing these blacks, as well as other types of blacks such as HAF, FEF, EPC, SRF and Thermal in liquid latex styrene-butadiene and, after coagulating, washing and drying, the products are marketed as black masterbatches. Details of the preparation of such masterbatches have been described by Forrester *(1)*, Samuels *(2)*, Drogin *(3)*, and Williams *(4)*. Types of commercially available masterbatches are also listed in Table I.

Influencing Factors

A formulation and a mixing process must be established for the final product. First, the proper ingredients for compounding must be selected, and second, a process must be devised whereby the incorporation and dispersion of the ingredients can be achieved economically in a minimum of time for producing an end product of satisfactory quality.

The ease of incorporation and thoroughness of dispersion will tend to be influenced by the characteristics of the ingredients, by the mixing equipment, and by the processing technique. Details are shown in Table II. Much will also depend on the process engineer, who should be thoroughly familiar with the finished product requirements, factory mixing equip-

Based on a paper delivered before the Southern Rubber Group, Houston, Texas, on February 23, 1960.

ment, and possess the know-how to achieve satisfactory dispersion.

Examples of Banbury procedures for dry mixing various types of stocks are shown in Table III. These represent commercial practices used for incorporating and dispersing ingredients in stocks for tire treads, inner tubes, and mechanical rubber goods. The Banbury mixings are made under various operating conditions and in different cycle time. In some cases, the stock is completely mixed in a single pass and, in other cases, a dry masterbatch is first prepared and then completed in a final mix.

In this Table are also included the procedures for incorporating and dispersing carbon black in styrene-butadiene latex for the preparation of black masterbatch.

Rubbers

When mixing a batch, the rubber used influences to some extent the incorporation and dispersion of the ingredients. This is due to the characteristics of the rubber (Table II) such as differences in molecular weight, higher viscosity during the early stages of mixing, and improved wetting characteristics. Each type of rubber behaves a little differently in break down and in its subsequent acceptance and dispersion of ingredients. Smoked sheets are tougher to break down than ambers, and ambers are tougher to break down than bark. The amount of oxidizable material in these grades is partly responsible for this difference in break down. Compounding with SBR, as pointed out in *"The Vanderbilt Rubber Handbook,"* 1958, requires a more liberal use of softeners and tackifiers than is required with natural rubber. Butyl will break down more readily when loaded with pigment.

Nitrile rubber is tougher than natural rubber and when worked generates more heat. It breaks down much less than natural rubber and, when mixed on an open roll mill, the break-down rate will depend upon the tightness of the roll setting and mill cooling facilities. Well dispersed reinforcing pigments are needed to develop the optimum physical properties of nitrile vulcanizates *(5)*.

Both SBR and natural rubber will vary in uniformity. The former is much cleaner. In the case of natural rubber, cutting, mastication, blending and cross-blending are often necessary to obtain greater uniformity.

Reclaimed rubber is remarkable because of its uniformity *(6)*. It mixes more readily than natural or synthetic rubber. In addition, reclaimed rubber contains the fillers, softeners and other materials which were included as mixing aids in the original compound.

Certain neoprene stocks are difficult to mix because of their tendency to stick to equipment and to scorch. These, therefore, need careful control. In the case of Neoprene GN, age makes a difference: the older it is, the more difficult it is to process.

Since it is difficult to process 100 per cent *cis*-4 polybutadiene, or 100 per cent *cis*-polyisoprene, and obtain satisfactory incorporation and dispersion of ingredients, it is recommended to blend either of these rubbers with natural rubber.

The softer the rubber, the more difficult to attain good dispersion. When blending a harder rubber in a softer one, depending upon the proportion used, the hard rubber will tend to float in the soft one and make it more difficult to obtain satisfactory dispersion.

Moisture in any rubber is a problem as it interferes with dispersion. It transfers from the rubber to the interface of the pigment and causes agglomeration.

Reinforcing Type Pigments

The finer particle size carbon blacks are more difficult to disperse than the coarser ones. The difficulty, as pointed out by Sweitzer, et al. *(7)*, and by Dannenberg, et al. *(8)*, is due to the higher cohesive forces binding these finer particles within the agglomerates as well as the increased surface requiring wetting by the rubber. The surface characteristics and chemistry of a carbon black may also influence the incorporation and dispersion, due to difficulty of wetting by the rubber. Low bulk density black will take longer to incorporate than high bulk density. Black with an excess of fines will take longer to incorporate and to disperse. Hard pelleted black may incorporate more readily, but may take longer to disperse. Furnace blacks behave differently from channel blacks.

In SBR, reinforcing furnace blacks disperse more readily than channel black because the latter has lower structure and different surface chemistry. In natural rubber, on the other hand, channel black is easier to disperse than high reinforcing furnace blacks.

The optimum values of black reinforcing pigments are only developed by their maximum dispersion. In order to achieve the proper dispersion, it is necessary, after the breakdown of the rubber, to incorporate the carbon black first, and after it has been dispersed in the rubber by shearing action, to add the plasticizers.

As pointed out by Rostler and DuPont *(9)*, the rubber matrix has to be stiff enough to break up the pellets or agglomerates of the pigment and also grind them into the smallest individual particles. But, on the other hand, the matrix must also be sufficiently plastic to accept the pigment readily and to give a uniform distribution of the pigment throughout the mix. A stiff matrix will give better dispersion than a soft matrix because of the greater shearing action of the more viscous material. The shearing action of the matrix is fundamentally dependent on the viscosity of the masticated rubber itself, since the shearing action of the uncompounded rubber matrix must be responsible for dispersion of at least the first addition of the pigment. That a rubber mix containing poorly dispersed pigments can be only partially repaired by remilling or refining justifies this assumption.

Non-black pigments include certain fine particle precipitated calcium carbonates, hard clays, sulfates, zinc oxide and hydrated silicon compounds, including calcium silicate and silicon dioxide.

Carbonates, as indicated by Vodra *(10)*, and Vodra

and Jarvis *(11)*, are not all alike and require different processing techniques. Those which have been precipitated give no trouble in incorporation and dispersion if their particles are large but, if they are ultrafine, they are then difficult to disperse. Fine particle carbonates are, therefore, coated with a thin film of water-insoluble matter. This prevents coalescence into large aggregates. The coating agents may consist of oil or high molecular weight fatty acids. Since they remain on the pigment after drying, they also help disperse it when mixed into rubber.

Precipitated whiting seems to be sticky and incorporates with a great deal of reluctance. The fine particle whitings develop heat and tend to agglomerate.

Magnesium oxide and zinc carbonate do not incorporate easily. Sulfate pigments incorporate more easily and give better processing than carbonates. Blanc Fixe ($BaSO_4$) is one of the easiest to disperse and is best processing. Due probably to characteristics of the acid radical, the sulfate ion goes in easily, whereas the carbonate ion is just the opposite.

Clays, in general, are easy to incorporate into rubber, but the resulting compounds are harsh and dry. Clays will cause trouble when wet and dried out. They are then crumbly and difficult to incorporate. All clays tend to get mushy. The hard type clay, when mixed on an open mill, tends to become soft and sticky. No differences are observed with high-loaded clay stocks when mixed in the Banbury but, when dropped on the mill, they will fall through to the pan, become flaky and hard to disperse. Clay will carry zinc oxide in rubber and, therefore, will reduce the mixing time, but care must be taken to work the pigments in carefully, otherwise the dispersion will be poor.

The hydrated sodium silico aluminate or microlitic zeolite (Zeolex 23) sometimes referred to as regenerated clay has outstanding dispersing characteristics *(12)*.

Reinforcing silica, such as Hi-Sil (hydrated calcium silicate), is, as pointed out by Wolf *(13)*, easily mixed into natural rubber. It is rapidly taken up by the rubber and is easily dispersed. However, the precipitated calcium silicate hydrate, Silene, disperses with difficulty, due to contained moisture which causes agglomeration. When Silene agglomerates, it is difficult to redisperse. The ease of incorporating Silene in rubber depends also on the condition of the Banbury. If the Banbury is quite worn and the clearance between the rotors and the chamber is large, the pigment will incorporate readily. But if the Banbury is new, the clearance is naturally reduced and, therefore, it will be difficult to incorporate the Silene. Silene is very fluffy. It is, therefore, advisable to mix it whenever possible with the black.

Particle size is important when incorporating silicates. The difficulty in incorporating fine silica is due to occluded air on the particles. Until such air is removed, dispersion is difficult.

Silica is readily incorporated in butyl and disperses without difficulty. A silica stock will stick less than a stock loaded with calcium silicate. Sticking can be prevented entirely by the use of an ester, such as tributoxy ethyl phosphate.

TABLE I—MATERIALS INVOLVED IN INCORPORATION AND DISPERSION OF INGREDIENTS

Rubbers

(1) Styrene-Butadiene
(2) Natural
(3) Butyl
(4) Neoprene
(5) Nitrile
(6) Reclaim (W.T.)
(7) *cis*-4 Polybutadiene
(8) *cis*-Polyisoprene
(9) Blends

Latex Black Masterbatches

(1) Black (Carbo Rubber)
  (a) Hot rubber with FEF, EPC. No processing oil added.
  (b) Cold rubber with HAF, FEF, EPC, MT. No processing oil added.
  (c) Cold rubber with SAF, ISAF, HAF, FEF, SRF. Processing oil added.
  (d) Cold rubber, non-staining, with SRF. No processing oil added.
  (e) Cold rubber, non-staining, with HAF. Processing oil added.
(2) Black, Oil-Extended (Carbo-Oil Rubber)
  (a) Cold rubber with ISAF, HAF, FEF. No processing oil added.
  (b) Cold rubber with SAF, ISAF, HAF, FEF. Processing oil added.
  (c) (Possibility of cold rubber, non-staining, with SRF, HAF. No processing oil added.)
  (d) (Possibility of cold rubber, non-staining, with HAF. Processing oil added.)

Pigments

(1) Reinforcing Types—Black
  (a) Super Abrasion Furnace, SAF, black
  (b) Intermediate Super Abrasion Furnace, ISAF, black
  (c) High Abrasion Furnace, HAF, black
  (d) Fast Extrusion Furnace, FEF, black
  (e) Easy Processing Channel, EPC, black
  (f) Fine Furnace, FF, black
  (g) General Purpose Furnace, GPF, black
  (h) High Modulus Furnace, HMF, black
  (i) Semi-Reinforcing Furnace, SRF, black
  (j) Thermal, Medium (MT) and Fine (FT) blacks
(2) Reinforcing Types—Non-Black
  (a) Hard Clay
  (b) Carbonates
  (c) Sulfates
  (d) Calcium Silicate
  (e) Silica
  (f) Zinc Oxide
(3) Filler Types
  (a) Soft Clay
  (b) Ground Whiting
  (c) Barytes
  (d) Blanc Fixe
  (e) Soapstone (talc)

Oils, Waxes, Processing Plasticizers, Resins, Peptizers

Antioxidants

Antiozonants

Ingredients Required for Cure

(1) Sulfur
(2) Accelerators
(3) Zinc Oxide
(4) Fatty Acids
(5) Etc.

Ingredients for Special Purposes

(1) Colorants (Titanium Dioxide, etc.)
(2) Odorants
(3) Antiseptics
(4) Blowing Agents

Ultra-fine non-black reinforcing fillers are not as difficult to process in SBR as in natural rubber.

Many zinc oxides vary in the rate of incorporation. The factors which influence this property are particle size and shape, amount and kind of particle surfaces, presence of occluded or absorbed gases, and compatibility with the polymer. Special types of zinc oxide which have had their particle surface coated uniformly with a fatty acid will, as pointed out by Jones and Snyder *(14)*, prevent the formation of hard zinc oxide specs caused by some sticky zinc oxide predensified in the Banbury chamber. The fatty acid coating also aids in the pigment-to-rubber wetting and results in a faster incorporation rate for the zinc oxide. Any soft lumps of the coated zinc oxide will readily break up during the mixing of the rubber composition. In cold weather, zinc oxide and other pigments will disperse more readily if previously stored overnight in a warm room rather than using the cold pigment directly from a warehouse or box car. It is advisable to keep the stearic acid away from the zinc oxide, otherwise the zinc oxide will cake and will be more difficult to disperse.

Emphasis is laid on the rapidity of incorporation of pigments of the filler type, such as soft clay, ground whiting, barytes, etc. Inasmuch as the loadings used in mechanical rubber goods are generally high, the dry material is often prewetted with a light petroleum oil to enable it to mix in more rapidly.

Water ground oyster shell (laminar) is said to have a naturally occurring organic coating which makes it more easily dispersible in rubber *(13)*.

Oils and Waxes

Oils and waxes used in rubber differ in the manner and rapidity in which they incorporate. Their characteristics (Table II) must, therefore, be taken into consideration.

As pointed out by Buckler and Mitchell *(15)*, the aromatic oils appear to give more easily processable blends than the more highly refined paraffinic oils, possibly because the former tend to contain more nitrogenous and metallic impurities than the paraffinic oils.

Pine tar is more of a solvent-type softener, especially for natural rubber. It is rather sticky and seems to grab on to the rubber and impart more tack. On the other hand, Circosol 2XH and Circo Light oils have somewhat of a lubricating action on the rubber and, therefore, do not incorporate as readily as pine tar. Paraflux also has some lubricating action, but not to the same extent as the Circosol 2XH. Oils used for incorporation in black masterbatches are generally heated to improve their flow through the pumps and expedite their incorporation. Low freeze oil, when thin, goes in very fast.

The mixing characteristics and use of an improved oil-extended rubber have been emphasized by Gale, et al. *(16)*.

Wax is more difficult to incorporate than oil. Higher melting point wax goes in slower than the ones with a lower melting point. Some waxes have to be melted before they are added to the rubber.

Special Purpose Ingredients: Colorants

Titanium dioxide, as pointed out by Breckley *(17)*, is the most suitable white pigment used for rubber. It has pigmentary properties, whereas zinc oxide does not. Titanium pigments are composed of fine and coarse particles as well as aggregates. The agglomerates are fairly loose. Titanium dioxide tends to incorporate in rubber with relative ease (literally falls in), but does not yield as good an ultimate dispersion as zinc oxide. Presumably there is a much better pigment-to-polymer compatibility in the case of zinc oxide than titanium dioxide. Titanium dioxide incorporates much easier than clay on the mill. Colored pigments, like iron oxide, etc., are more difficult to disperse than titanium dioxide.

The optimum value of colored pigments, as emphasized by Willets, et al. *(18)*, is only developed by their maximum dispersion and it is equally true that the optimum value of white pigments is similarly dependent on their proper dispersion.

Organic dyes are generally used in masterbatch form.

Curatives: Sulfur

The problem of rapid incorporation and thorough dispersion of sulfur in a batch without unduly increasing the batch temperature has always confronted the rubber industry. To cope with this problem, many sulfurs used in rubber generally contain an additive such as oil, or carbon black, or magnesium carbonate. The additive not only helps to reduce considerably the flying of sulfur dust in the mill room, but also makes the sulfur non-caking, free flowing, non-lumping during the mixing with the rubber, and insures rapid incorporation and uniform dispersion of the sulfur throughout the mass. The oil-treated sulfurs contain from 2.5 to 10 per cent oil.

Black Bird Sulfur, which is non-caking, contains 0.5 to 1.0 per cent carbon black. The black adheres to the sulfur, thereby preventing agglomeration of the sulfur.

Spider Brand Sulfur contains 2.5 per cent magnesium carbonate.

Regular sulfur, when added late in the Banbury mix, on the Banbury sheeting mill, or at the end of a mill mix, tends to agglomerate in the raw stock and cause hard lumps in cured products. Insoluble sulfur, which is used only to prevent bloom in the uncured state, really presents a problem to incorporate and disperse in rubber.

Crystex Sulfur, containing 85 per cent insoluble sulfur and having the finest particle size of any sulfur, previously contained no oil and was, therefore, very difficult to disperse in rubber. Oil had to be added to remedy the situation. Now Crystex Sulfur may contain as much as 20 per cent oil.

Monsanto's Sulfur 60 is insoluble and contains no additive.

In working with insoluble sulfur, it is important to watch the temperature in the mix as at high temperature, reversion to soluble sulfur takes place. According to Kemp, et al. *(19)*, heterogeneous or

TABLE II—FACTORS INFLUENCING INCORPORATION AND DISPERSION OF INGREDIENTS

Characteristics of the Rubber
- (1) Types or Grades
- (2) Condition
  - (a) Age
  - (b) Shape
  - (c) Wet or Dry
  - (d) Plasticity
  - (e) Thawed or Frozen
  - (f) Contamination
- (3) Ability to Break Down
- (4) Wettability
- (5) Processing Characteristics
- (6) Mill Behavior

Characteristics of the Pigments
- (1) Physical Form
  - (a) Loose
  - (b) Densified
  - (c) Mechanical Aggregation
    - Pelleted (beads)
    - Pellet (bead) Condition
      - per cent distribution
      - pellet (bead) hardness
    - Roller Pressed
    - Fines
  - (d) State of Aggregation
- (2) Bulk Density
- (3) Packing (Western Electric test)
- (4) Degree of Densification of Mechanical Aggregation
- (5) Physical and Chemical Characteristics
  - (a) Particle Size and Distribution
  - (b) Moisture
  - (c) Volatility
  - (d) Structure
  - (e) Chemical Composition of Particle Surface
  - (f) Surface Characteristics
  - (g) Surface Treatment
- (6) Additives
- (7) Loading per 100 Parts Rubber Hydrocarbon
- (8) Masterbatching
- (9) Preparation for Mixing
- (10) Blends

Characteristics of the Activators—Antioxidants—Antiozonants—Curatives
- (1) Types
- (2) Physical Form
  - (a) Solid
    - Powder
    - Fines
    - Flakes
    - Pellets
    - Briquettes
    - Rods
  - (b) Liquid
- (3) State of Aggregation (Caking)
- (4) Melting Point
- (5) Solubility
- (6) Compatibility with the Rubber
- (7) Chemical Properties
- (8) Surface Treatment
- (9) Additives
- (10) Masterbatch

Characteristics of the Oils—Plasticizers
- (1) Viscosity
- (2) Volatility
- (3) Flash Point
- (4) Solubility
- (5) Compatibility with the Rubber
- (6) Loading per 100 Parts Rubber Hydrocarbon

Characteristics of the Waxes
- (1) Physical Form
  - (a) Slab
  - (b) Flake
- (2) Melting Point

Formulation

Types, Characteristics, and Amounts of Ingredients are important.

Mixing Equipment
- (1) Internal Mixer
  - (a) Size
  - (b) Mechanical Condition
  - (c) Clearance Between Rotors and Chamber
  - (d) Rotor Speed, RPM
  - (e) Horse Power
  - (f) Ram Pressure
  - (g) Cooling or Heating
  - (h) Water Supply, Characteristics and Temperature
- (2) Open Roll Mill
  - (a) Size
  - (b) Roll Speed Ratio
  - (c) Horse Power
  - (d) Roll Setting
  - (e) Cooling or Heating
  - (f) Type of Roll
  - (g) Roll Thickness
  - (h) Blender and Accessory Equipment

Processing
- (1) Banbury
  - (a) Type and Nature of Stock
  - (b) Capacity
  - (c) Speed
  - (d) Batch Size
  - (e) Nature and Condition of Rubber
  - (f) Nature and Condition of Ingredients
  - (g) Order and Method of Addition of Ingredients
  - (h) Mixing Time and Discharge Temperature
  - (i) Temperature of Mixing
  - (j) Cooling and Stock Conditioning
- (2) Open Roll Mill
  - (a) Type and Nature of Stock
  - (b) Batch Size or Mill Capacity
  - (c) Roll Setting
  - (d) Roll Temperature
  - (e) Order of Addition of Ingredients
  - (f) Working of Batch
  - (g) Mixing Time
  - (h) Finished Stock Temperature
  - (i) Cooling and Stock Conditioning

spotty vulcanization results from undissolved and non-uniformly dispersed sulfur in the unvulcanized mix.

Some sulfur may be used in the form of a masterbatch (50 per cent) to expedite dispersion. The sulfur is added either in the Banbury or on the sheeting mill. The stock temperature should not exceed much above 220°F. to prevent pre-cure.

Curatives: Accelerators

Considerable progress has been made in the manufacture of accelerators to have them in an acceptable form and suitable for factory handling. Accelerators are now available in various physical forms, such as briquettes, flakes and rods, to reduce dusting and aid in incorporation and dispersion. They are also available in powder form and in fines (for mill mix where melting temperatures are not reached). The MBT type accelerator offers no problem in dispersion. It is coated with 2 to 3 per cent mineral oil to facilitate dispersion, especially in wire stock, where any agglomerates of accelerator would induce blow holes in the stock. On the other hand, the MBTS type accelerator is an unusual material in that it is most difficult to disperse. It, therefore, requires an additive dosage of 4 to 8 per cent oil and metallic stearates to act as a dispersant and lubricating agent for the MBTS.

Sulfenamide type accelerator offers no problem in dispersion.

Some accelerators, such as MBT and MBTS, are sometimes masterbatched (20 to 25 per cent), but it is not essential for sulfenamide-type accelerator to be masterbatched.

The best point of addition of accelerators is at the end of the mix, in the Banbury, for a minute or

two of mixing. It is also best to have the pigment work all completed prior to working in the accelerator. It is to be noted that once the accelerator has been incorporated, the more work put on the stock, the less efficient will be the accelerator. In other words, the stock containing the accelerator should be processed only to the point needed, especially when it contains sulfenamide. DPG is worst in that respect.

The sulfenamide type accelerator is not too stable at high temperature and often tends to lose that portion which is intended to prevent the accelerator from scorching.

Only very few accelerators, such as 808 and Beutene, are in liquid form and, therefore, when these are incorporated in rubber, care must be taken that they do not break up the batch.

As pointed out by Smith *(20)*, the problem of good dispersion is complicated in the case of certain rubber chemicals which tend to sinter during storage at elevated temperatures, especially if prolonged storage is involved. In the case of sulfenamide-type accelerators and certain other chemicals, storage at elevated temperature may produce adverse effects during processing, due to decomposition at the higher storage temperatures.

Antioxidants and Antiozonants; Retarders; Peptizers

There are no problems in dispersing antioxidants of any type. These, whether solids or liquids, are readily dispersed. They do not contain any additives to facilitate their incorporation and dispersion, nor are they normally masterbatched. Antioxidants are generally added earlier to the batch. In SBR, they should be added early to prevent anti-gelling and to improve plasticity and thus produce a better working batch. However, in natural rubber, nothing is gained thereby from a processing standpoint.

If the dosage of a liquid antioxidant is high, it may break up the batch. It may also fume and volatilize if the temperature of the batch is too high.

Liquid antiozonants should be added slowly, otherwise the batch may break. It is sometimes advisable to split the dosage.

Retarders generally are added in the first pass.

Peptizers are added first. The temperature should be watched. As pointed out by Smith *(20)*, the liquid form, such as RPA No. 3, offers an advantage over the powder form. It can be sprayed on the rubber as a fine mist. Dripping of such small amounts of liquid peptizer would produce poor dispersion and non-uniform softening of the rubber.

Mixing Equipment

The incorporation and dispersion of ingredients in rubber are accomplished either on an open roll mill or in an internal type of mixer, such as the Banbury or the Shaw Intermix. For each type of mixer there are a number of factors (Table II) which govern the effectiveness of the incorporation and dispersion of ingredients. More effective incorporation can be obtained on an open mill than in a Banbury since the heat build-up on a roll mill is less and the shearing action is higher because the stock is not as soft.

According to Jones and Snyder *(14)*, pigment incorporation on an open mill is a much less critical operation than in an internal mixer. When the pigment is dumped into the nip of an open mill, the rate of incorporation is slow and there is relatively little control over the speed with which the pigment is absorbed in the rubber mass. The situation is quite different in the case of the internal mixer where the movement of the rotors folds the pigment into the rubber while developing a high degree of shear. The action of the rotors virtually forces the pigment into the rubber mass under pressure. The pressures developed in the chamber of the mixer are dependent upon rotor speed, volume of the material in the chamber, and the applied pressure of the ram which is usually activated by compressed air.

Processing

In the processing of stocks in the Banbury or on an open roll mill, it should be understood that every compound is an individual case, and that each plant must be considered on an individual basis. It must also be taken into consideration that Banburys will vary.

For stocks requiring more than one pass mix, it is best to use a large batch in the first pass mix and an undersize batch in the second pass mix to avoid building up too much heat. High speed Banbury mixing does not develop as much heat as in normal speed mixing because in the relatively short cycle time normally used in high speed mixing, the stock is already discharged before it can become too hot.

Milling essentials, for adequate dispersion of carbon black in rubber, are high viscosity in the masterbatch mix without initially high temperature, plus as much premixing of carbon black and rubber as possible before milling to insure maximum carbon-rubber bonding and minimum rubber degradation. Martin and Parkinson *(21)* had emphasized that the ultimate dispersion of compounding materials made depends upon the stiffness of the rubber, i.e., on its ability to set up high shearing forces. A decrease of viscosity of stock due to the addition of oil causes a decrease in dispersion. Remilling will produce variable dispersion, the effects depending to a large extent on the polymer. Remilling of natural rubber stocks in the Banbury definitely improves the dispersion of ISAF black. On the other hand, in cold SBR stocks, remilling does not improve dispersion of ISAF black.

It was pointed out thirty years ago by Depew *(22)* that it is hard to completely surround a pigment particle with rubber and because of this difficulty, the surface of many rubber stocks are dry. The surface is one of rubber with pigment particles sticking out of it. A pigment well wet by rubber will completely submerge in it and the surface, for instance, of a calendered sheet containing it will be a clean rubber surface.

Sequence of Ingredient Addition

It is customary to add the reinforcing pigments in the early stages of mixing to take advantage of the higher amounts of shear provided by the stiffness

TABLE III—BANBURY PROCEDURES FOR DRY MIXING VARIOUS TYPES OF STOCKS

Tread Stock (SBR)

(A) Tread, Single Pass
(Banbury Size No. 11; Speed, 40 rpm)

Min.	
0	Load black masterbatch, lower ram, full pressure
½	Raise ram, add chemicals, lower ram, full pressure
1½	Inject oil
3	Raise ram, add curatives, lower ram, full pressure
3½	Raise ram, sweep down, lower ram, float
4	Raise ram, open slide, dump batch
5	Close slide, reset clock next batch

(B-1) Tread, Masterbatch
(Banbury Size No. 11; Speed, 40 rpm)

Min.	
0	Load SBR, lower ram, full pressure
1	Raise ram, add all black, lower ram, full pressure
2¾	Inject oil
4	Raise ram, add chemicals, lower ram, full pressure
5	Raise ram, open slide, dump batch
5½	Close slide, reset clock next batch

(B-2) Tread, Final
(Banbury Size No. 11; Speed, 30 rpm)

Min.	
0	Load ⅔ of masterbatch; add curatives, balance of masterbatch; lower ram; full pressure
1½	Raise ram, sweep down, lower ram, float
2½	Raise ram, open slide, dump batch
3½	Close slide, reset clock next batch

(C-1) Tread, Masterbatch
(Banbury Size No. 11; Speed, 40 rpm)

Min.	
0	Load SBR; add zinc oxide, stearic, antioxidant, black; lower ram; full pressure
2¼	Inject oil
4	Raise ram, open slide, dump batch (Temp. 280°F.)

(C-2) Tread, Final
(Banbury Size No. 11; Speed, 30 rpm)

Min.	
0	Load latex black masterbatch; add auxiliary masterbatch, accelerator, sulfur, antiozonant; lower ram, full pressure
1¼	Raise ram, open slide, dump batch (Temp. 220°F.)

Tread Base Stock (SBR)

(A-1) Tread Base, Masterbatch
(Banbury Size No. 11; Speed, 60 rpm)

Secs.	
0	Load rubber; add zinc oxide, antioxidant, stearic acid
15	Close door, load 82½ parts black
45	Lower ram (Line Pressure 85#)
82½	Take air off ram, inject oil
112½	Door still closed, weight still down, oil scale discharged to surge tank
135	Door still closed, weight down, dump batch 325°-340°F.
150	Move masterbatch to pelletizer

(A-2) Tread Base, Final
(Banbury Size No. 11; Speed, 30 rpm)

Secs.	
0	Load pellets, add sulfur and accelerator
10	Close door
15	Weight down
115	Weight up, open door
120	Dump batch 225°-240°F.
165	Reset clock

Butyl Tread Stock

(A-1) Butyl Tread, Masterbatch
(Banbury Size No. 11; Speed, 40 rpm)

Min.	
0	Load butyl, add elastopar, lower ram, full pressure
½	Raise ram, add 50# of black over ram, lower ram, full pressure
2	Raise ram, add 50# of black, lower ram, full pressure
3½	Raise ram, add zinc oxide and stearic, lower ram, full pressure
5½	Raise ram, add balance of black, add softener, lower ram, full pressure
7½	Raise ram, open slide, dump batch

(A-2) Butyl Tread, Final
(Banbury Size No. 11; Speed, 40 rpm)

Min.	
0	Load masterbatch; add accelerator, sulfur; lower ram; full pressure
1¾	Raise ram, open slide, dump batch at 220°F.

Butyl Tube Stock

(A-1) Butyl Tube, Masterbatch
(Banbury Size No. 11; Speed, 40 rpm)

Min.	
0	Load ½ of oil; add all the Butyl, all the Butyl Reclaim, Polyac, Zinc Oxide, SRF black, lower ram, full pressure
1	Raise ram, add FEF black, lower ram, full pressure
2	Raise ram, add balance of oil, lower ram, full pressure
6	Raise ram, open slide, dump batch

(A-2) Butyl Tube, Final
(Banbury Size No. 11; Speed, 40 rpm)

Min.	
0	Load masterbatch, lower ram, full pressure
½	Raise ram, add sulfur and accelerator, lower ram, full pressure
1½	Raise ram, open slide, dump batch

(B-1) Butyl Tube, Masterbatch
(Banbury Size No. 11; Speed, 40 rpm)

Min.	
0	Load Butyl; add Polyac, Zinc Oxide, SRF, EPC; lower ram; full pressure
2	Raise ram, add FEF and oil, lower ram, full pressure
4	Raise ram, sweep down, lower ram, full pressure
5	Raise ram, open slide, dump batch

continued on next page

TABLE III (Cont'd)—BANBURY PROCEDURES FOR DRY MIXING VARIOUS TYPES OF STOCKS

(B-2) Butyl Tube, Final
(Banbury Size No. 11; Speed, 30 rpm)

Min.	
0	Load strained masterbatch, lower ram, full pressure
1	Raise ram, add curatives, lower ram, full pressure
2	Raise ram, sweep down, leave ram up
2½	Raise ram, open slide, dump batch
4	Close slide and reset clock

Mechanical Extrusion—60-65 Durometer

(A-1) Mechanical Extrusion, Masterbatch
(Banbury Size No. 11; Speed, 30 rpm)

Min.	
7	Load SBR; add odd weight of black, wax, whiting, chemicals; lower ram; full pressure
5½	Raise ram, add balance of black, lower ram, full pressure
4	Inject oil
2½	Raise ram, sweep down, lower ram, full pressure
1½	Raise ram, open slide, dump batch
0	Close slide, reset clock to 7 min.

(A-2) Mechanical Extrusion, Final
(Banbury Size No. 11; Speed, 30 rpm)

Min.	
0	Load ⅔ of masterbatch; add curatives, balance of masterbatch; lower ram; full pressure
1½	Raise ram, sweep down, lower ram, full pressure
4	Raise ram, open slide, dump batch
5	Close slide, reset clock to 0 min.

MRG Stock—35 Durometer

(A) MRG, Single Pass, Upside Down Mix
(Banbury Size No. 11; Speed, 40 rpm)

Min.	
6	Load chemicals, whiting, oils; add SBR on top; lower ram; full pressure; add black on top of ram
4	Raise ram, sweep down, lower ram, full pressure
2½	Raise ram, add curatives, sweep down, lower ram, full pressure
1	Raise ram, open slide, dump batch
0	Close slide, reset clock to 6 min.

Latex Black Masterbatch

(A-1) Conventional Process

Dry grind black in Mikro
Prepare slurry
Add dispersing agent
Blend with the latex
Coagulate with salt-acid
Wash
Dry
Bale

(A-2) Dispersant Free Process

Dry grind black with steam in free energy mill (Jet-O-Mizer) or wet grind in Mikro or Colloid Mill
Prepare slurry
Blend immediately with the latex
Coagulate with acid
Wash
Dry
Bale

of the stock. Processing oils, waxes, and plasticizers generally follow after the dispersal of the reinforcing pigments.

Each type of compound, as pointed out by Smith *(20)*, should be studied for the optimum order of addition to be sure of the best obtainable results. Peptizers should be added at the very first stage. In natural rubber compounds, there is some evidence that it would be best to add antioxidants in the final mix, but the higher melting antioxidants and antiozonants are, in the case of natural rubber and SBR,

Zinc oxide, stearic acid, antioxidants and antiozonants are in the case of natural rubber and SBR, introduced in the mix ahead of the reinforcing carbon black. The early addition of the zinc oxide, noted by Jones *(23)*, improves the quality of the rubber compound and contributes to accelerator stability at the higher mixing temperatures. Greater processing safety is gained, however, by late addition of zinc oxide to the batch.

Retarders, curatives and blowing agents are best processed in the final mixing operation.

The addition of small amounts of plasticizer before incorporation of the filler is sometimes an aid to reaching the plastic stage. Reduction of heat generation during milling is another important purpose of plasticizer addition in the early stages of the mixing process. The method occasionally practiced of adding plasticizers and fillers at the same time to the rubber gives satisfactory compounds in some cases, but in the majority of cases, dispersion is poor. The reason is that the fillers and plasticizers form wet lumps which because of local lubrication escape the shearing action exerted by the rubber and thus resist dispersion. The addition of oil with the first half of the carbon black leads to a depressed dispersion and physicals, whereas the addition of oil after all the carbon black has been incorporated, enhances dispersion and physicals.

In the case of nitrile rubber, alternate and incremental addition of pigments and plasticizers is recommended for the Banbury technique, and in cases where high concentrations of plasticizer are used in open mill mixing. The batch size and amount of plasticizer will determine the size and number of the additions. Carbon blacks or other fillers must be added slowly and carefully so as to insure proper dispersion at this stage. If they are not properly dispersed at this point, it will be necessary to remill the stock carefully, which will take much more time than if it is accomplished at the initial stage.

If two or more carbon blacks or other fillers are used in the same compound, it is often desirable either to mix them before incorporation or to add

small quantities of each alternately. If there is a considerable quantity of inactive stock in the bank, a "cutout" of part of the batch should be made before adding pigments. This "cutout" should be changed about midpoint of pigment addition. Proper sulfur dispersion can be attained by adding the sulfur early in the mixing operation, for example, a minute or two after adding the nitrile to the Banbury. It should be added on the mill as early as possible. Treated sulfur, on the other hand, can be added at the end of mixing operations and still be adequately dispersed. Accelerators and special chemicals which have sulfur available for vulcanization can be added at any desired point in the mixing cycle and still promote optimum tensiles.

Precaution must be used in the mixing of butyl. The batch will break up if ingredients are added too fast. Butyl is often seeded to keep the batch intact.

An idea of current practices for incorporating and dispersing ingredients in rubber can be gained from Table III, which deals with Banbury procedures for dry mixing various types of stocks. It should be emphasized that the procedures described are not to be construed as being standard practice followed at every plant. Type and condition of equipment, set-up, production requirements, quality standards and many other factory conditions play an ever increasing role in governing the procedure used. A mixing cycle in vogue at one plant could no doubt be reduced or increased at other plants.

Factories taking advantage of black masterbatch may well achieve their final stock in a single pass mix or perhaps in a one-plus mix. By the latter is meant that some of the rubber specified in the formulation will be used in the preparation of an auxiliary masterbatch containing a portion of the black and oil which are still required for the completion of the compound, plus the chemicals (zinc oxide, stearic acid and antioxidant). This auxiliary masterbatch and the curatives are then added to the black masterbatch in the final pass Banbury mix.

Discharge of the final stock may in some factories be governed by the temperature reached in the Banbury rather than by a time requirement. The cycle may be in terms of minutes, in the case of slow speed mixing, and in terms of seconds, in the case of high speed mixing. In some factories, the clock indicating cycle time may be set for the time to recede as mixing progresses and the ingredients are added, or the clock may be set for the time to advance with increasing mixing time. The above is mentioned to emphasize the individuality of plants in establishing mixing procedures deemed best to provide the most rapid incorporation of ingredients and their dispersion.

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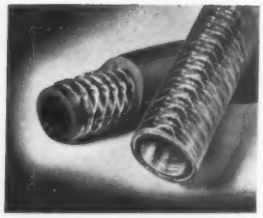

FIG. 1—Knitted fabric.

Knitted Hose Reinforcement

Technique permits mechanical knitting of hose reinforcement during the fabrication sequence

By R. M. HARBECK
Singer-Fidelity, Inc., Philadelphia 24, Pa.

ANNUALLY over the past ten years, between 50 and 100 million feet of hose have been produced in the United States with knitted fabric reinforcement. This reinforcing technique is fairly new, being preceded by braided fabric, by the use of circular looms, and by use of prewoven reinforcing fabrics. These older techniques require considerable hand labor, and careful design of the hose to avoid twist, and expansion under high pressures.

In contrast, mechanical knitting of the hose reinforcement as part of the fabrication sequence can be handled at production speeds of 10 to 20 feet per minute. Supply packages of fabric cones weighing three to ten pounds can be used on the knitting equipment without rewinding onto bobbins, saving both rewinding cost and floor space, and eliminating a great deal of operator knotting and reloading time.

Working Characteristics

Hose with knitted reinforcement is dimensionally stable and comparatively stronger. For example, with plain, square, or lock stitch knitting, a burst strength of about 375 psi on ¾ inch i.d. hose can be achieved. A new knitting machine recently developed by Singer-Fidelity with the cooperation of several leading manufacturers of hose has enabled this burst strength to be increased in production runs to 560 psi on ¾ inch i.d. plastics hose. With ⅜ inch i.d. rubber hose, strengths up to 1200 psi have been achieved, and on double reinforced ¼ inch i.d. rubber hose, 1900 psi has been achieved.

To achieve the same burst strength as previous types of knitting equipment, hose reinforced with this unit requires 30 to 40 per cent less yarn. The new knitting action making this possible can add up to four strands of yarn (Figure 1), circumferentially laid in and out of the special knitted fabric. The operation of the unit, shown in Figure 2, below, is relatively simple.

The yarn supply of eight cones revolves around the stationary knitting head at a speed of about 380 r.p.m. The cam and core assembly inside the head revolves at the same speed, causing the latch type needles to move up and down, catching and interlocking the various yarns. Four of the yarns form the basic knit fabric, while the alternate yarns form the wrap, being wound around the tubing in a spiral.

Knit Yarn Function

The knit yarns hold the wrap yarns in place and provide the longitudinal strength in the hose. The wrap yarns provide most of the circumferential strength in the hose, and because of the direct lay, produce a highly efficient use of the yarn.

The haul-off speed is governed by the openness of the stitch that is required. The tighter the stitch, the lower the production rate. Yarn size also affects fabric design. The knitting machine can easily knit zero twist. Multifilament rayon from 300 to 4400 denier, nylon yarns of 520 and higher deniers, and even glass fiber yarns can be knit satisfactorily.

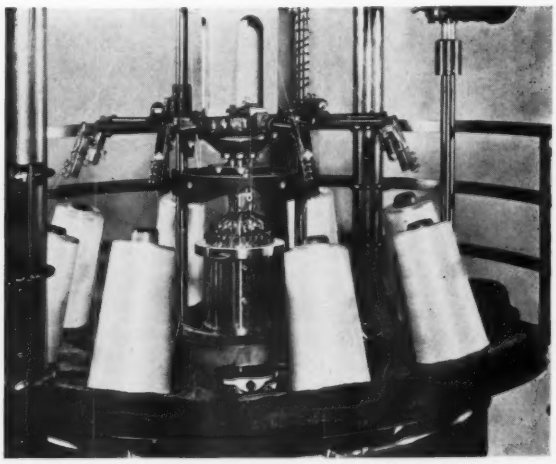

FIG. 2—Eight cones revolve around knitting head at 380 rpm.

Rubber Division Meeting

Chicago, Illinois, September 6-8, 1961

THE 80th meeting of the Division of Rubber Chemistry, American Chemical Society to be held on September 6, 7 and 8, 1961 at the Hotel Sherman in Chicago, Ill., will feature a joint symposium with the ACS Petroleum Division on "Elastomers from Petroleum Hydrocarbons." The symposium will be held on Wednesday, September 6 with W. J. Sparks (Esso Research) as general chairman. The morning session of the symposium will be chaired by Harold Gershinowitz (Shell Development) while the afternoon session will be chaired by George R. Vila (U.S. Rubber). The symposium will be held in the Grand Ballroom of the Palmer House.

On Thursday, September 7 and the morning of Friday, September 8, the Rubber Division will continue its meetings in the usual manner with a full schedule of papers. W. S. Coe (Naugatuck Chemical), chairman of the Rubber Division, will preside at the session on Thursday morning and G. E. Popp (Phillips Chemical), division vice-chairman, will preside at the session on Thursday afternoon.

T. C. Argue (Roth Rubber), will chair the last technical session on Friday morning. Mr. Argue, incidentally, is general chairman of the Local Arrangements Committee for the meeting with James Sheridan (New Jersey Zinc) as general vice-chairman.

The usual luncheon meeting of the 25-Year Club will be held beginning at 11:30 A.M. on Thursday morning, September 7. Ben W. Lewis (Witco Chemical) will preside. The business meeting of the Rubber Division will be held at 11:35 A.M. on September 7, and will feature the presentation of the Best Paper Award to William M. Hess (Columbian Carbon) for the paper entitled "The Analysis of Pigment Dispersion in Rubber by Means of Light Microscopy, Microradiography and Electron Microscopy," which he delivered at the Spring Meeting of the division.

Abstracts of all the papers to be presented at the Chicago meeting follow:

Program of the

DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY

Sherman Hotel, Chicago, Illinois
September 6-8, 1961

Tuesday Morning—Sept. 5

10:00 A.M.—Registration.

Wednesday Morning—Sept. 6

9:00 A.M.—Joint Petroleum and Rubber Division Symposium on Elastomers. (Palmer House)

Wednesday Afternoon—Sept. 6

1:30 P.M.—Joint Petroleum and Rubber Division Symposium on Elastomers (Cont'd.)

Thursday Morning—Sept. 7

9:00 A.M.—Technical Session—General Papers.
11:30 A.M.—25-Year Club Luncheon, Ben W. Lewis, Presiding.
11:35 A.M.—Business Meeting.

Thursday Afternoon—Sept. 7

2:00 P.M.—Technical Session—General Papers.

Friday Morning—Sept. 8

9:00 A.M.—Technical Session—General Papers.

Wednesday Morning—Sept. 6

Joint Petroleum and Rubber Division Symposium on Elastomers from Petroleum Hydrocarbons

W. J. Sparks, Presiding
H. Gershinowitz, Session Chairman

9:00 A.M.—1—Introductory Remarks, W. J. Sparks, General Chairman.

9:05 A.M.—2—New Developments in Raw Materials for Synthetic Rubbers. *Harold Gershinowitz and D. B. Todd (Shell Development Co., New York, N. Y.). (Paper will be presented by Mr. Gershinowitz).*

No abstract available.

9:30 A.M.—3—Catalysts for the Polymerization of Isoprene to *Trans* 1,4-Polyisoprene (Synthetic Balata). *J. S. Lasky, H. K. Garner and R. H. Ewart (U. S. Rubber Co., Wayne, N. J.). (Paper will be presented by Mr. Lasky).*

A catalyst prepared from aluminum triethyl and vanadium trichloride has been reported in the literature to polymerize isoprene to *trans*-1,4-polyisoprene. The efficiency of this heterogeneous catalyst has been increased by a factor of ten or more by supporting the vanadium trichloride on clay to increase its surface area. A further and even more substantial improvement in efficiency was achieved by adding a tetraalkyl titanate as a third catalyst component. This gave a highly active soluble catalyst system for the preparation of synthetic balata. Properties of synthetic balata compared to natural balata are also given.

10:00 A.M.—4—The Polymerization of Butadiene with Alkyl Aluminum and Cobalt Chloride. ***Morris Gippin (Firestone Tire & Rubber Co., Akron, Ohio).***

Diethylaluminum chloride-cobalt chloride catalyzed polybutadiene having 98 per cent *cis*-1,4 structure has been reported in the literature. Detailed studies in this laboratory have established that, contrary to published data, the diethylaluminum chloride-cobalt chloride system requires a narrow ratio of water as a third component before it can function smoothly and efficiently. The soluble diethylaluminum chloride combination with low amounts of pyridine-complexed cobalt chloride also requires water. At the optimum ratios of the alkylaluminum, cobalt chloride and water, polybutadiene of 98 per cent *cis*-1,4 content, 5 to 7 dilute solution viscosity and zero gel was obtained. Polymer viscosity is inversely proportional to the cobalt chloride-pyridine concentration and varies directly with the water concentration.

Within certain limits the *cis*-1,4 content varies inversely with the cobalt chloride-pyridine and directly with the diethylaluminum chloride concentrations. Changes in the monomer concentration in benzene have a pronounced effect on polymer molecular weight and gel formation, and also affect the microstructure. Certain organic derivatives of water failed as substitutes, but aluminum trichloride can be used to replace water on an equimolar basis. The *cis*-1,4 content decreases at higher polymerization temperatures. Polymer molecular weight was lowered by the use of higher pyridinates of cobalt chloride and by mixtures of benzene and hexane as polymerization solvent. The rate of polymerization is linear with time in the early stages, and appears to be first order with respect to monomer at a fixed catalyst concentration. The requirement of the water component with diethylaluminum chloride and cobalt chloride eliminates the uncertainty factor in this catalyst, which otherwise depends on adventitious moisture or oxygen to give variable, non-reproducible results.

10:30 A.M.—5—Inorganic Halides in Vinyl Pyridine Rubber. ***W. F. Brucksch, Jr. (U. S. Rubber Co., Wayne, N. J.).***

Pyridine rubber is a diene synthetic rubber which is very resistant to abrasion. The reactions of pyridine groups, therefore, may contribute to physical properties. One reaction to consider is formation of coordination complexes. This study was made to show if inorganic compounds which are known to coordinate pyridine also interact with pyridine rubber. It has been found that pyridine rubber is made stronger by the addition of certain inorganic halides. A kind of cross linking results, probably by coordination of pyridine nitrogens. The product has improved physical properties: Gum stocks show higher tensile strength; filled stocks show higher tensile strength and elongation at 100°C. and greater resistance to abrasion and to cut-growth. The system also has the capacity to develop high modulus. Because of this, lower amounts of filler may be used. The result is a compound which has hysteresis properties like a carcass stock and abrasion resistance like a tread stock. This is an interesting combination of properties, which should find useful applications.

11:00 A.M.—6—Chlorobutyl Rubber — Optimum Processing Procedures. ***G. J. Ziarnik (Esso Research and Engineering Co., Linden, N. J.).***

The chlorination of butyl rubber has produced a new general purpose elastomer with faster cure rate, more stable cross-links, and wider compounding versatility than conventional butyl rubbers. Isobutylene-isoprene copolymers are chlorinated under controlled conditions so that the reaction is primarily one of substitution at the allylic position of the isoprene segment with little loss in original unsaturation. Increased functionality permits (1) the use of a wide range of curatives and (2) blending with high unsaturation elastomers, thus providing the rubber compounder with additional tools for the solution of technological problems associated with the fabrication of commercial articles.

Because of chlorobutyl's increased reactivity, MgO is generally added to control scorch. Since MgO also retards vulcanization, some cure rate advantage is sacrificed. Data indicate that MgO also retards polymer-pigment reinforcement. However, heat treating appears to reduce the retarding influence of MgO on reinforcement without appreciably altering the vulcanization process. The net effect is an apparent sharp increase in cure rate without loss of process safety. Process and vulcanization studies in gum and carbon black systems will be discussed.

11:30 A.M.—7—Anionic Polymerization of Dienes. ***Maurice Morton (Institute of Rubber Research, University of Akron, Akron, Ohio).***

Although the polymerization of dienes by alkali metals has bene known for many years, it is only recently that a fuller understanding of the process has been achieved. The initiation reaction is now considered to consist of an electron transfer from the metal surface to the monomer, leading to formation of a radical anion. The latter may then form a di-anion by reacting with a similar species, or it may do so by undergoing a second electron transfer from the metal surface. Which of these reactions occurs depends on the reactivity of the metal, its surface area and the type of solvent used. For the least active metal, lithium, it is possible to have a longer lifetime of the intermediate radical anion, during which time both radical and anionic polymerization may go on.

The Ziegler-Natta catalysts lead to polymerizations involving initiation, propagation and termination steps, with regeneration of the catalyst surface. Therefore, although the conversion increases with time, the molecular weight need not. The soluble anionic initiators, on the other hand, like sodium naphthalene or the organolithium compounds, show only initiation and propagation but no termination or transfer, when suitable precautions are taken. Hence it is possible to have all the chains growing simultaneously, provided the initiation reaction is very fast compared with propagation. A very sharp molecular weight distribution may thus be obtained, unlike the case of the alkali metals, where initiation goes on at the metal surface throughout the polymerization, leading to a broad molecular weight distribution.

The homogeneous anionic polymerizations of dienes (and styrene) show a marked dependency of rate on solvent present. This is considered due to the nature and reactivity of the carbanion-lithium bond. Thus, in tetrahydrofuran, the anion is presumably "free" and more active, whereas, in hydrocarbon solvents, it is bound in an associated complex and is much less active. This is reflected by the activation energy for propagation, which is three times higher in hydrocarbon solvents than in THF.

Wednesday Afternoon—Sept. 6

G. R. Vila, Session Chairman

1:30 P.M.—8—Revolution in Elastomers. ***G. R. Vila (U. S. Rubber Co., New York, N. Y.).***

No abstract available.

2:00 P.M.—9—New Vulcanizing Systems for Ethylene-Propylene Elastomers. ***John Rehner, Jr. and Peter W. Wei (Esso Research and Engineering Co., Linden, N. J.). (Paper will be presented by Mr. Rehner).***

The absence of chemical functionality in ethylene-propylene elastomers precludes crosslinking with conventional rubber vulcanizing agents. It is known that such elastomers can be vulcanized with combinations of sulfur and certain organic peroxides, but the resulting vulcanizates leave much to be desired from the standpoint of tear strength, odor, and peroxide cost. A chemical study of the reaction between isoparaffins, sulfur, and organic peroxides gave results showing that some important alterations must be made of previous views that have been advanced for the vulcanization of saturated hydrocarbon elastomers by peroxides alone. A new reaction scheme is briefly reviewed. In the course of this study, three new classes of substances have been discovered to be effective vulcanizing agents for ethylene-propylene

elastomers, and for other rubbers also. The outstanding characteristics which these new agents produce in ethylene-propylene elastomer vulcanizates are excellent tear strength and no objectionable odor. Data are presented on some properties of vulcanizates prepared with these agents.

2:30 P.M.—10—Vulcanization of Chlorinated Ethylene-Propylene Copolymers. ***G. Crespi and M. Bruzzone (Instituto di Chimica Industriale del Politecnico, Milano, Italy). (Paper will be presented by Mr. Crespi).***

The chlorination of the ethylene-propylene copolymer constitutes the first step of a process studied in order to make this polymer vulcanizable by means of the vulcanizing and accelerating agents which are usually employed in the rubber industry. The subsequent step, consisting of a partial dehydrochlorination of the polymer, determines the formation in the chains of double bonds; therefore, in the presence of sulfur and of suitable accelerating agents, the formation of crosslinks occurs. Dehydrochlorination and vulcanization of copolymers with a chlorine content from 5 to 20 per cent are effected simultaneously, because dehydrochlorination, occurring during the thermal cycle of vulcanization, is sufficient to allow a complete crosslinking of the polymer. Under these conditions, dehydrochlorination is generally limited to tertiary chlorine, or, in any case, to the amount of thermally less stable chlorine, which constitutes a determined percentage of chlorine introduced in the polymer.

The properties of ethylene-propylene copolymers are remarkably modified by the introduction of chlorine in the chains. Even small amounts of halogen exert an influence on the dynamic properties of the polymer. Greater amounts of halogen transform the initial polymer, which is prevailingly elastic, into a prevailingly plastic one. With a further increase of the chlorine content in the copolymer, more and more rigid substances are obtained until obtaining hard and fragile material. Data on vulcanization and compounding variables are reported in this paper along with physical properties of the vulcanizate.

3:00 P.M.—11—Chemical Aspects of Ethylene-Propylene Rubber Vulcanization with Aralkyl Peroxide and Co-agents. ***A. E. Robinson, J. V. Marra and L. O. Amberg (Hercules Powder Co., Wilmington, Del.). (Paper will be presented by Mr. Marra).***

Owing to its characteristic paraffin inertness, ethylene-propylene rubber (EPR) poses a difficult vulcanization problem. The best practical solution to date is a process based on aralkyl (or alkyl) peroxide. The peroxide vulcanization process is a sequence of free-radical reactions involving initiation, transfer, and termination steps. The rate-determining reaction is thermal cleavage of the peroxide. Crosslinking efficiency in EPR is an inverse function of the propylene content. (Efficiency is defined as the ratio of actual to theoretical cross-link density based on a theoretical cross-link productivity of one cross-link per molecule of peroxide.) Beta-scission of the rubber molecule is apparently the main efficiency-reducing factor.

Three approaches are recognized for improving the crosslinking efficiency: (a) Reduction of the propylene content of the copolymer. (b) Suppression of the copolymer scission reaction. (c) Improvement of the cross-link productivity above one cross-link per molecule of peroxide. Requirements other than vulcanization efficiency (e.g., processability requirements) limit the reduction of propylene content. A copolymer of 33 mole-per cent propylene is a tentatively favored compromise for many purposes. The crosslinking efficiency of the 33 per cent copolymer with dicumyl peroxide (alone) is approximately 65 per cent of the theoretical.

Both suppression of scission and improvement of cross-link productivity may be achieved, it appears, by means of coagents which react additively with rubber radicals. Two mechanisms of coagent reaction are envisaged. With agents of a class typified by quinone dioxime, a mechanism is envisaged wherein addition of the rubber radical is fast, and the polymer scission reaction is substantially forestalled. Resonance-stabilized intermediate radicals are produced which may ultimately cross-link by coupling. Crosslinking efficiency may be increased to 100 per cent (no higher) by these co-agents.

By an alternative mechanism, coagents of the divinyl adipate type form comparatively reactive intermediate radicals which may propagate themselves by hydrogen abstraction. Multifunctionality is required of the coagent for cross-link formation by this mechanism. Radicals are not consumed, however, thus crosslinking efficiency may theoretically exceed 100 per cent with these agents. The effect of elemental sulfur, a coagent of the quinone dioxime type, is partly offset by a wasteful reaction with peroxide. The beneficial effect of sulfur on the performance characteristics of peroxide-cured EPR may be attributed partly to the inherent quality of sulfur cross-linkages. The stoichiometric relationship of bound sulfur to peroxide in cured EPR suggests that linkages up to trisulfide may be formed.

3:30 P.M.—12—Ethylene-Propylene Copolymers Produced with Soluble Catalysts. ***R. J. Kelly, H. K. Garner, H. E. Haxo and W. R. Bingham (U. S. Rubber Co., Wayne, N. J.). (Paper will be presented by Mr. Kelly).***

Soluble catalyst systems derived from alkyl aluminum halides in combination with vanadium oxytrichloride or tetrachloride produce highly random ethylene-propylene copolymers with high catalyst efficiency. By the choice of the alkyl aluminum halide and molar ratio of aluminum to vanadium, variations in polymerization efficiency and molecular weight are possible. The coploymers prepared with these soluble catalysts show advantages in both processing and physical properties over those prepared with heterogeneous catalysts. Vulcanizates of these copolymers show somewhat different accelerated aging properties depending on the additives used along with the peroxide. Low temperature properties of copolymers containing less than 70 weight per cent propylene show a tendency for crystallization which is not shown by X-ray diffraction. Over-all physical properties and tire tests show some preference for the 65 weight per cent propylene copolymer over the 50 per cent material.

4:00 P.M.—13—A New Hydrocarbon Elastomer—I. ***E. K. Gladding, B. S. Fisher, J. W. Collette and co-workers (E. I. du Pont de Nemours & Co., Wilmington, Del.). (Paper will be presented by Mr. Gladding).***

Sulfur curable elastomers derived from olefins and diolefins will be described. This paper is concerned with the composition of the polymers and methods for their synthesis using coordination catalysts. Certain factors which influence the laboratory-scale polymer synthesis will be discussed also. Thus, the effects of catalyst type, polymerization temperature and diene structure on the rate of polymer formation and on polymer composition will be outlined. Polymer properties will be discussed in general terms with particular emphasis on oxidative stability.

4:30 P.M.—14—A New Hydrocarbon Elastomer—II. ***J. J. Verbane, M. S. Fawcett, E. J. Goldberg and co-workers (E. I. du Pont de Nemours & Co., Wilmington, Del.). (Paper will be presented by Mr. Verbanc).***

A new hydrocarbon elastomer synthesized from petrochemical intermediates using coordination catalysis is described. This amorphous polymer (a) resembles commercial diene elastomers in general appearance, (b) is completely soluble in hydrocarbon and chlorinated hydrocarbon solvents and (c) is stable to prolonged storage. It can be vulcanized effectively by the use of accelerated sulfur systems and reinforced by numerous fillers such as carbon blacks, clays and certain silicas. Reinforced vulcanizates are strong, resilient, and extremely resistant to oxygen, ozone, heat, light, and many chemical agents. Properly compounded vulcanizates exhibit excellent electrical and low temperature properties. Permeability to gasses, specifically nitrogen, oxygen and carbon dioxide, parallels natural rubber. Thermal diffusivity and thermal conductivity are ~15 per cent greater than polyisoprene. The practical significance of the thermal data remains to be determined.

4:50 P.M.—15—Summary. ***Herman Mark (Polymer Research Institute, Brooklyn Polytechnic Institute, Brooklyn, N. Y.).***

Thursday Morning—Sept. 7

W. S. Coe, Session Chairman

9:00 A.M.—16—Effect of Block Structure in Ethylene-Propylene Rubber on Processibility and Physical Properties. *C. E. Scott (AviSun Corp., Marcus Hook, Penna.).*

Ethylene-propylene rubber can be prepared in a variety of ways. The resultant copolymers are often quite similar in molecular weight and ethylene-propylene content. However, examination and characterization of these materials by differential thermal analysis indicates the micro-structure to differ. The presence of block structures (either ethylene or propylene) promotes orientation and crystallization in the polymer upon milling at 260-270°F. Shear stability of the polymers is not noticeably affected by quantity of block structure. However, compounding ethylene-propylene rubber with a reinforcing carbon black such as Philblack O results in an excessive stiffening if the base rubber contains excessive quantities of block structures. Vulcanizates are prepared using 2,5-dimethyl-2,5 di(t-butylperoxy) hexyne-3 as the crosslinking agent. Mechanical properties of the vulcanizate are also influenced by the amount of block structure. Increasing quantities of block structure result in a vulcanizate having reduced tensile, increased hardness, and high permanent set, Low temperature and hysteresis properties are also adversely affected.

9:25 A.M.—17—Unsymmetrical Diisocyanates, II. *L. C. Case (Dept. of Chemical Engineering, Purdue University, Lafayette, Ind.).*

Isocyanate groups in aromatic diisocyanates with unsymmetrically placed substituents react at different rates. In particular, aromatic isocyanate groups having a single ortho substituent react appreciably slower than unsubstituted aromatic isocyanates. The purpose of this research was to investigate the reaction rates of aromatic diisocyanates having one isocyanate group flanked by two ortho substituents.

A total of 7 such diisocyanates were synthesized, and their reactions with isoamyl alcohol in chlorobenzene determined by following the disappearance of the isocyanate bond in the IR spectrum. Whereas the ratio of apparent rate constants varied from 3 to 9 for singly hindered diisocyanates, the ratio for these doubly hindered diisocyanates varied from 7 to 100. There was no immediate correlation of reactivity ratio with structure among these latter diisocyanates.

Several of the doubly hindered diisocyanates can be readily synthesized at relatively low cost. These isocyanates with large differences in reactivity between the two groups allow a considerable degree of control over polyurethane formulations. Thus, "tailored" formulations using such diisocyanates are of theoretical and practical interest. The advantages of such diisocyanates in specialty elastomer, adhesive, and coating formulations are discussed.

9:45 A.M.—18—Compounding of Hydrocarbon Elastomers for Potential High Temperature Applications. *J. K. Sieron, and K. Murray (Elastomers Section, Elastomers and Coatings Branch, Nonmetallic Materials Laboratory, Materials Central, Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio). (Paper will be presented by Mr. Sieron).*

Research indicates that certain hydrocarbon type elastomers which have the important property of high strength at elevated temperatures can be stabilized by the use of selected additives to permit extended use in the 400°F.–450°F. range. The studies include butyl, chlorobutyl, and two types of ethylene-propylene elastomers. An example of what can be accomplished by compounding techniques is illustrated by the chlorobutyl study. The data indicate that an unstabilized zinc oxide-phenolic resin cured chlorobutyl rubber compound retained only about 35 per cent of its original tensile strength after aging eight hours in an air oven at 400°F.; whereas, the same compound when stabilized retained about 75 per cent of its original tensile strength. Elastomeric materials which possess high strength at elevated temperatures are required by the Air Force for advanced system components. Hence, emphasis was directed to evaluations at 400°F. and above.

10:00 A.M.—19—Compounding of *Cis* 1-4 Polybutadiene for Pneumatic Tire Applications. *(R. J. Brown, J. F. Kerscher, R. B. Knill and R. V. Todd (Goodyear Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Brown).*

Budene 500, a high *cis* polybutadiene, provides the compounder with a new versatile tool in all phases of pneumatic tire compounding. Due to the unique nature of this rubber, new compounding techniques are required to obtain optimum performance in tire applications. Oil level, type of black, and type of acceleration have pronounced effects on performance. In tire treads, *cis* 1-4 polybutadiene provides improved wear and tread cracking resistance in proportion to the ratio of polybutadiene/conventional polymers. When substituted for natural rubber, *cis* 1-4 polybutadiene improves carcass durability due to its superior aging resistance and high resilience characteristics. The combination of good abrasion, excellent aging and good heat resistance of Budene 500 offers possibilities of improved tire performance in both passenger and truck sizes.

10:30 A.M.—20—Development of a Reinforcing Resin for Butyl Rubber and Other Specialty Elastomers. *G. B. Freda and R. L. Stukey (Marbon Chemical Div., Borg-Warner Corp., Washington, West Va.). (Paper will be presented by Mr. Freda).*

Conventional styrene-butadiene copolymer resins are widely employed as processing aids and reinforcing resins in SBR and natural rubber compounds but, in general, are unsatisfactory for compounding with elastomers having little or no unsaturation such as butyl rubber or Hypalon. This is primarily attributed to the wide differences in cure rates and incorrect compatibility between the resins and the elastomers. A new type of styrene-based resin has been developed that is completely saturated, has the proper compatibility, and is not deleterious to the cure thus overcoming the problem. Other important properties are good physical form, light color, low specific gravity and adaptability to a wide range of curing systems. Now, for butyl, Hypalon, brominated butyl, chlorobutyl and neoprene, the rubber compounder can obtain the advantages of hardness, reinforcement and processing in all of these specialty elastomers that were formerly available only in compounds of styrene-butadiene resins and general purpose elastomers.

10:45 A.M.—21—Transition Measurements Using Differential Thermal Analysis (DTA) Techniques. *M. L. Dannis (B. F. Goodrich Research Center, Brecksville, Ohio).*

A system for the study of polymer structure by differential thermal analysis (DTA) techniques is presented. The need for an inert reference body has been eliminated by the use of a thermal delay within the sample itself. Typical data showing both first and second order transition behavior for appropriate polymers are presented. The applicability of the technique to liquids is also shown. Three first order transitions have been found in *trans*-1,4-polybutadiene. The insoluble nature of high polymers in one another is again confirmed, even in those systems which disperse well. The latent heat of crystallization of *cis*-1, 4-polybutadiene is about 2.1 kcal./mol.

11:00 A.M.—22—Use of Differential Thermal Analysis for Structural Characterization of Ethylene-Propylene Rubber. *J. R. Knox (AviSun Corp., Marcus Hook, Penna.).*

Differential thermal analysis has been used for the examination and characterization of ethylene-propylene rubbers. The glass transition temperature may be used to determine

the per cent propylene in the random portion of an ethylene-propylene copolymer, independent of any ethylene or propylene blocks. If ethylene or propylene crystallinity is present, the amount may be calculated from the area under the melting peaks observed on the thermogram. The presence of non-crystalline ethylene blocks or propylene blocks may also be observed. Some data are presented indicating that the type of non-crystalline propylene block, isotactic or atactic, may be determined.

11:15 A.M.—23—Identification of Rubber Elastomers by Mass Spectrometry. *J. K. Phillips (Goodyear Tire & Rubber Co., Akron, Ohio).*

The urgent need for a rapid means of identifying rubber elastomers in rubber compounds led to this investigation of instrumental analysis of high polymers. A new procedure has been developed whereby the identity of a rubber elastomer or elastomers in a rubber compound can be made within a few minutes by the use of mass spectrometry and high temperature pyrolysis. The analytical procedure is simply a rapid high temperature pyrolysis of a few milligrams of the sample, in vacuo, on an arc-imaging furnace followed by an analysis of the gaseous pyrolyzate on a mass spectrometer. The exposure time normally used is two seconds on the arc-imaging furnace which is capable of attaining a black body temperature of 6000°F. The total elapsed time for analysis including loading of the sample, evacuation, pyrolysis, and scanning on the mass spectrometer is approximately twenty minutes.

The identifications are made by the use of numerical values obtained from empirical formulae. These formulae were derived from ratios of intensities at certain mass numbers in the mass spectrum of standard samples. These numerical values when plotted against known mixtures also permit semi-quantitative determinations on mixtures of certain rubber elastomers. Semi-quantitative determinations have been made on natural/SBR, natural/*cis*-PBD, and SBR/*cis*-PBD compounds. Qualitative analyses have also been made on various textile polymers including a distinction between nylon 6 and nylon 66. It is felt that this new and rapid procedure for identifying rubber elastomers and other polymers will prove to be a valuable tool to rubber chemists and technologists in general.

Thursday Afternoon—Sept. 7

G. E. Popp, Session Chairman

2:00 P.M.—24—"Blow-Point" in Tire Compounds. *H. A. Freeman (Goodyear Tire & Rubber Co., Akron, Ohio).*

Since the advent of faster tire cures, particularly in bladder presses, it becomes increasingly important to know at what point in the curing process the tire compounds would blow or give porosity at pressure release. The tire cure then must proceed well beyond that "blow-point" before pressure release. A laboratory method has been developed to indicate the blow-point of tire compounds. For test, 6 x 6 inch rubber blocks are prepared with built-in thermocouples through the center. One block has 2 plies of calendered fabric and the other has 4 plies. Onto a 0.15 gauge sheet-cured biadder stock is placed 2 and 4 plies of calendered fabric. The inch-deep mold is then filled with tread stock. Thermocouples are placed between each sheet and up into the tread. Test blocks are then cured and equivalent cure determined at each station.

Non-thermocoupled test pieces are cured at times near the suspected blow-point. They are then cut through the center and examined for blows or porosity. Some tests such as hardness, adhesion (ply stock to tread), swell and modulus on the specimens were tried but these must include cooling cure after pressure release. Results indicate that the blow-point on tire tread compounds is at somewhat less than 25 per cent of optimum cure for a given compound. The laboratory tests were compared with actual tire cure and found to have close correlation.

2:25 P.M.—25—Improvements in Durability of Natural Rubber Vulcanizates. *G. F. Bloomfield, M. Braden, J. R. Dunn, S. G. Fogg and M. W. Philpott (Natural Rubber Producers Research Association, Herts., England). (Paper will be presented by Mr. Bloomfield).*

In compounding rubbers for maximum life at high temperatures the established preference for "sulfurless" curing systems has been placed on a sound scientific basis and with an undertanding of the principles involved further improvements have been forthcoming. Not only can their effectiveness be enhanced by selected antioxidants but activation by substances capable of participation in thioanion-disulfide interchange enables thiuram curing systems to function at temperatures of 100°C. or even lower. The activated cures can be used advantageously in latex processes giving marked improvements in heat aging. The protection of translucent vulcanizates against light presents a special problem since some amines which protect against thermal degradation photosensitize aging in light. Stress relaxation studies have revealed that a mixture of a substituted bis-phenol and a light absorber gives good protection.

Two entirely different modes of action have been recognized among the many unrelated substances providing varying degrees of protection against ozone. The more important class of antiozonants, the N N' dialkyl p-phenylene diamines, raise substantially the critical stored energy required for crack growth; several other types of antiozonant chemicals (including 6-ethoxy-2,4,4-trimethyl-1,2 dihydroquinoline) merely decrease the rate of crack growth. The N N'-dialkyl-p-phenylene diamines give adequate protection under static conditions; under intermittent dynamic conditions involving both ozone and fatigue good protection is given by N-alkyl-N'-aryl p-phenylene diamines plus wax, but the best results are obtained by admixture of one of these unsymmetrical p-phenylene diamines with N N'-dialkyl-p-phenylene diamine.

2:45 P.M.—26—Temperature Coefficient of Vulcanization for Present Day Tire Compounds. *J. C. Ambelang, K. C. Beach, and D. F. O'Sullivan (Goodyear Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Ambelang).*

The rate of change of vulcanization rate with temperature has been widely assumed to be 1.5 per 10°F. even though it has been recognized that the value is not constant. Since the above value was experimentally established for Hevea rubber, synthetic rubbers, furnace blacks, delayed action accelerators and high temperature cures have profoundly altered the composition and cure conditions of tire compounds. Development of the physics of high polymers indicates a fresh look at the methods of cure evaluation and at such concepts as "optimum" cure. The measurement of cure state has now been based on: (a) degree of crosslinking—from swell measurement; (b) modulus at 100 per cent elongation, and (c) modulus at 300 per cent elongation.

While the last is the least desirable in theory it is the most familiar and practical in rubber manufacturing. For representative tread type compounds in the region of 80 per cent of maximum modulus the mean values obtained were: Hevea 1.4; SBR 1.3; and *Cis*-polybutadiene 1.4. These coefficients were corroborated by means of 100 per cent modulus and crosslinking data and were verified by comparing predicted moduli with experimental values. Since these values are lower than 1.5, more nearly equivalent state of cure can be reached if the new experimental temperature coefficients are employed in calculating the time required at different temperatures.

3:05 P.M.—27—DPG (Diphenyl Guanidine) Accelerated Vulcanization. I. Gum Stocks. *M. L. Studebaker and L. G. Nabors (Phillips Chemical Co., Akron, Ohio). (Paper will be presented by Mr. Studebaker).*

A study has been made of the vulcanization of DPG-accelerated, sulfur-cured natural rubber gum stocks. The chief tools employed are cross-link measurements by the swelling procedure and group analyses in which the vulcanizates are reduced with lithium aluminum hydride and the reduced samples titrated potentiometrically for sulfide and mercaptan. The effects of DPG level, zinc oxide and stearic acid are followed. These compounding ingredients are shown to exert

readily demonstrable influence on the polysulfide cross-link density and hence upon the total cross-link density. The rate of formation of polysulfide cross-links is markedly influenced by the DPG level.

3:25 P.M.—28—DPG (Diphenyl Guanidine) Accelerated Vulcanization. II. Carbon Black Stocks. *M. L. Studebaker and L. G. Nabors (Phillips Chemical Co., Akron, Ohio). (Paper will be presented by Mr. Studebaker).*

The influence of DPG, zinc oxide and stearic acid on the vulcanization of natural rubber in the presence of the HAF black, Philblack O, was similar in many ways to their influence on gum stocks. However, the apparent cross-link densities as calculated from swelling measurements were markedly increased. When simple DPG-accelerated natural rubber vulcanizates were prepared containing a variety of types and loadings of carbon blacks, certain chemical effects could be observed which can be related to the properties of the various carbons. The quinone content of the various carbon blacks is particularly important in determining the rate at which polysulfide cross-links develop, especially in the early stages of cure.

3:45 P.M.—29—DPG (Diphenyl Guanidine) Accelerated Vulcanization. III. The Action of "Soluble Zinc Sulfide." *M. L. Studebaker and L. G. Nabors (Phillips Chemical Co., Akron, Ohio). (Paper will be presented by Mr. Studebaker).*

The action of various compounding ingredients studied in the first two papers in this series suggest that hydrogen sulfide in some form is important in the development of polysulfide cross-links during DPG-accelerated vulcanization of natural rubber. This led to experiments on the elusive material called "soluble zinc sulfide." In this paper some of these experiments are described and the results are combined with those of Bedford, Craig, Moore and others to give added insight into the mechanism of DPG-accelerated vulcanization.

4:05 P.M.—30—The Distribution of Rubber Literature. *John McGavack (Leonia, N. J.).*

The references in the "Rubber Bibliographies" for the years 1941-1959 have been tabulated to review the growth of rubber literature and to determine whether the United States is maintaining leadership in this field. The volume of rubber literature has undergone a 262 per cent increase during the period 1941-1959. For the period 1951-1958, the increase plots as a straight line growth curve of 13.5 per cent. A sharp increase of 26 per cent occurred in 1959 over the 1958 references. The largest growth rate of 680 per cent for 1941-1959 appears in the subject of Rubberlike Plastics. For the same period, references to Synthetic Rubber increased 278 per cent. Other growth leaders included the subjects of Chemistry and Physics of Rubber, Vulcanization, Antioxidants, Adhesives, and Tires. Decreases in references were found in the subjects of Rubber Derivatives and Reclaim. The United States has led in the number of references published in practically all categories with strong competition in recent years coming from the Russian publications.

4:25 P.M.—31—The South, Fastest Growing Rubber Area. *D. A. Reneau and E. W. Howard (United Carbon Co., New York, N. Y.). (Paper will be presented by Mr. Reneau).*

This talk presents the past growth and future prospects of the rubber industry in the South. The main emphasis is on a recap of the tire and tread industry in this part of the country. A history of 25 years is portrayed on tire production and 20 years on tread rubber. Information on personnel is included. In addition, statistical data on production by allied industries, such as SBR, carbon black, masterbatch, petroleum and fabrics is also presented.

4:45 P.M.—32—Evaluation of Antiozonants via Stress Relaxation. *G. E. Decker and R. W. Wise (Monsanto Chemical Co., Nitro, West Va.). (Paper will be presented by Mr. Decker).*

One of the most frequently used methods for appraising the extent of ozone cracking in rubber vulcanizates is visual examination. The subjective nature of the visual method leaves much to be desired and considerable effort has been spent developing an objective evaluation procedure. A method based upon stress relaxation of a small rubber specimen during exposure to ozone has been developed. Accelerated and outdoor exposure results, both static and dynamic, are presented on a variety of N,N′-disubstituted-*p*-phenylenediamines. These data show the method to be discriminating, reproducible and extremely rapid. An ozone cabinet was constructed for accelerated testing in which it is possible to maintain the ozone concentration to within ±5 at 25 parts per hundred million. A unique apparatus was developed for the simultaneous flexing of seventy-two small specimens.

Friday Morning—Sept. 8

Theodore C. Argue, Session Chairman

9:00 A.M.—33—Gas Chromatographic Analysis of Antidegradants. *R. W. Wise and A. B. Sullivan (Monsanto Chemical Co., Nitro, West Va.). (Paper will be presented by Mr. Wise).*

Analytical methods which are rapid, precise and specific have long been needed for the quantitative analysis of rubber antioxidants. Gas chromatography offers a new tool to the rubber chemist for the analysis of antioxidants which overcomes many of the problems associated with the use of the more classical techniques. Rapid and precise gas chromatographic methods for the quantitative analysis of a wide variety of rubber antidegradants have been developed. The methods have also been used to identify and determine the amounts of antidegradants in rubber vulcanizates. Typical of the rubber chemicals which have been successfully analyzed by these techniques are N-isopropyl-N′-phenyl-*p*-phenylenediamine, N,N′-diphenyl-*p*-phenylenediamine, phenyl-β-naphthylamine, etc. Experimental details, typical chromatograms and analyses of some of the more common antidegradants are presented.

9:15 A.M.—34—Adsorption Chromatographic Analysis of Petroleum Oils. *T. B. Smitherman (Texaco, Inc., Port Arthur, Texas).*

This paper describes the chromatographic separation of class constituents in rubber processing type oils. A solution of the oil is passed through a column of adsorptive silica gel and washed successively with normal heptane, benzene and pyridine. The constituents removed by these selective solvents are classed as non-aromatics, aromatics and polar compounds, respectively. Data are presented to indicate the method precision and superiority over earlier methods.

9:35 A.M.—35—Laboratory Method for Testing Rubber Release Agents. *G. P. Yates and P. E. Oppliger (Dow Corning Corp., Midland, Mich.). (Paper will be presented by Mr. Yates).*

The purpose of this work was to devise a test method capable of screening potential silicone release agents. To industrial users of release agents this method is valuable because (a) it is a method that is faster and more economical than production evaluations, and (b) it is a method that detects differences not immediately recognizable on production equipment. Laboratory test results have been confirmed by previous production evaluation programs. Also, theories with regard to the performance of silicone-type release agents have been substantiated. The majority of these tests has involved comparisons of silicone release agents that were significantly different in their chemical composition and physical properties. Tests were also made in which silicones were compared to non-silicone materials.

To industrial users of release agents who are interested in securing the most efficient and economical agent, this test

provides a practical method for screening potential materials. Economies can also be effected since (a) the test method requires a minimum amount of inexpensive material and eliminates the risk of ruining production pieces, and (b) the test can rapidly evaluate, and give graphical analysis of, numerous release agents.

10:00 A.M.—36—Factors Controlling the Thickening of a Carboxylated Latex by a Polyacrylate Thickener. ***W. W. White (Naugatuck Chemical Div., U. S. Rubber Co., Naugatuck, Conn.).***

The effects of polymerization variables (emulsifier, potassium persulfate, and alkaline electrolyte concentrations) on the thickening of carboxylated styrene butadiene latices by polyacrylate thickeners were determined using statistically designed experiments. Adequate thickening of latices is important in many applications. The functional relationship between the controlled variables and the properties such as particle size and surface tension of the final latices were determined as was the relationship between the thickening of the latex and the latex composition including polymer particle surface area. Increases in alkaline electrolyte gave an inordinately (compared with non-carboxylated) large increase in particle size of the latices. Increases in emulsifier reduced while increases in potassium persulfate increased the particle size but these effects were relatively small.

The surface area (inversely proportional to particle size) of the contained polymer particles was the dominant factor in thickening—the viscosity increasing with increased surface area. The thickener efficiency was decreased by each of the controlled variables although the emulsifier effect was much less than expected. Tests performed on latices before and after dialysis confirmed the electrolyte and emulsifier effects. The alkaline electrolyte effects were associated with its control of the manner in which the acid monomer polymerized and the consequent nature of the polymer surface. Regression equations demonstrating the relationship between the controlled variables and thickening efficiency will be presented.

10:25 A.M.—37—A Rugged Semi-automatic Extensometer for Measuring Elongation of Rubber. ***Paul I. Donnelly (Hercules Powder Co., Wilmington, Del.).***

The evaluation of an elastomer—new or established—inevitably involves a study of tensile properties. ASTM procedure D-412 is generally used as a guide for the tensile testing of vulcanized rubber. In this method, an operator observes bench marks on the sample and records the modulus at every 100 per cent elongation, the ultimate elongation, and the tensile strength at break. An extensometer has been developed to eliminate operator coordination and judgment factors from rubber tensile testing. It is simple and sufficiently rugged for routine testing. Its features are a counterbalanced guide rod with a sliding electrical contactor, and specimen followers which automatically unlatch to avoid being damaged when specimens break. In addition there is a counter for direct digital indication of elongation and an electrical circuit which controls a short duration spark to mark the Autographic chart. Experience in testing up to 5000 specimens per year has shown that the apparatus makes an inexperienced operator as effective as a trained operator working under optimum conditions. The instrument has been used successfully on materials ranging from soft rubber to plasticized and filled polyvinyl chloride.

10:40 A.M.—38—Physical Test Methods for Critical Evaluation of High Performance Elastomers. ***C. F. Blaich and T. M. Vial (American Cyanamid Co., Bound Brook, N. J.). (Paper will be presented by Mr. Blaich).***

The development of new high strength elastomers in our laboratories required an examination of available physical testing methods for critical evaluation of experimental modifications. With these high performance materials, conventional test procedures were found to be insufficiently definitive or too time consuming. The Die C Tear Test (ASTM D-560) fell short, yielding similar readings for elastomers varying in hardness from 70 to 95 Shore A, in ultimate tensile from 4500 to 7500 p.s.i., and in elongation from 450 to 825 per cent. The Split Tear Test is more useful within a narrow hardness range, but not for elastomers of varying hardness, probably due to a stress distribution factor in the softer materials. A modification of the Trapezoid Tear Test (ASTM D-751) was found to yield more significant values.

Similar difficulties are observed with conventional tensile testing, as usually reported. Many high strength elastomers yield similar 300 per cent modulus, ultimate tensile and elongation values. Comparison of the entire stress-strain curve, especially at low elongations, gives better discrimination. Modification of the standard tensile test using ring and T-50 specimens were found to yield excellent comparative values, as well as conserving time. Compression set determinations (ASTM D-395, Methods A and B) were modified to obtain more meaningful comparative data in less time. Discussion and details of the methods and data are presented comparing the new elastomers with several commercial materials.

11:00 A.M.—39—An Electron Microscopic Reinforcement Criteria for Carbon Black Masterbatches. ***E. B. Prestridge (Copolymer Rubber & Chemical Corp., Baton Rouge, La.).***

The adequate dispersion of carbon black in rubber has long been recognized as an important factor in obtaining good physical properties in black rubber masterbatches. With the advent of wet masterbatching methods, which provide a preliminary dispersion of carbon black in latex, present techniques for the microscopic evaluation of the quality of this incorporation proved inadequate. An electron microscopic study was made to establish and define terms relating to the reinforcement of rubber stocks by carbon black at levels below the limits of resolution of the light microscope.

Using replica electron microscopy, examination was made of the dispersity and the physical habit of black particles in the fractured surfaces of black masterbatches. It was found that three terms were needed to correlate the quality of the black incorporation with the physical properties of the masterbatch. These are, in order of increasing effect on vulcanizate properties: dispersion, grinding, and bonding. The relation of these "reinforcement criteria" and the raw Mooney of the masterbatch reveals the striking effect of improved carbon black incorporation on this property and allows the possibility of evaluation of masterbatch production on a continuous basis. By the determination of the reinforcement criteria, the performance characteristics of a tread stock made with such masterbatches can be predicted with good reliability.

11:20 A.M.—40—N,4-Dinitroso-N-Methylaniline as a Promoter for Hevea and SBR. ***L. A. Walker and J. E. Kerwood (Monsanto Chemical Co., Nitro, W. Va.). (Paper will be presented by Mr. Walker).***

The great improvements in modulus, heat build-up, and dynamic properties in general which have been realized in butyl rubber tire formulations by the use of N,4-Dinitroso-N-methylaniline have, for some time, been attributed to increased reinforcement and/or increased elastomer-carbon black interaction promoted by the chemical. With the belief that improved reinforcement brought about by this chemical could be applied to elastomers other than butyl, the investigation was expanded to include Hevea, SBR, and blends of the two elastomers. The use of standard laboratory evaluations (stress-strain, Goodrich Flexometer, DeMattia Flex, hot tear strength) has been supplemented with torsional hysteresis, dynamic modulus, internal friction, and bound rubber measurements to show significant improvements in reinforcement. Laboratory tests have shown that, by the use of N,4-Dinitroso-N-methylaniline, up to fifty per cent of Hevea in tread formulations can be replaced by SBR with the resultant heat build-up and/or hysteresis properties being equal to or better than those of Hevea alone. Decreased amounts of curing agents in the promoted stock retain excellent hysteresis properties, improve flexlife, and hold the modulus relatively unchanged.

MATERIALS HANDLING AT MANSFIELD

How palletized tiers and mechanized handling simplify production routine

FIG. 1—In the foreground, a four-directional lift truck carries tire treads protected by canvas liners from production to the storage area. In the background another truck performs the same function.

FIG. 2—At the tire-building machine a 2000-pound capacity truck delivers two books of treads from the adjacent storage area.

STORAGE and handling problems are no doubt encountered by all companies in the rubber industry. Their successful solution, if not dramatic, can in many cases be measured in exceedingly real manhours and dollars. At The Mansfield Tire and Rubber Co., Mansfield, Ohio, a solution to rubber tread and tire handling problems involving the adoption of mechanized power equipment and palletized tiers, has, for instance, increased the capacity of warehouse storage areas by more than 50 per cent.

The initial problems, and the solutions explained below and shown in the accompanying illustrations, can perhaps be better understood, however, by an introduction to the firm itself.

In addition to producing tires and tubes in five plants across the country and in Canada, Mansfield Tire, in still other plants, manufactures tread rubber and other rubber items including rug underlay, brake diaphragms, and the like. At the company headquarters in Mansfield there are three factory buildings, one making truck and tractor tires, one for passenger tire production, and a third for fabric processing.

Four separate warehouse buildings with a total floorspace of 400,000 square feet are adjacent. The capacity of one of these warehouses was, before mechanization, 80,000 tires. It is now 120,000. In a second warehouse, partially palletized, capacity was 135,000 tires. It is now 190,000. Complete palletization will further increase its capacity to 236,000.

The Production Department

In the truck and tractor tire production department mechanized Raymond handling equipment is currently being used. These four-directional (frontwards, backwards, and sideways) fork trucks, two of which are shown in Figure 1, are used to move tread books from the weighing scale to storage and subsequently to the tire-building area.

FIG. 3—A Reach truck model E-3 lifts two loaded pallets in the warehouse from a 3-pallet, space-saving stack.

FIG. 4—The small pallet truck on the right is used on the warehouse dock to shuttle palletized tires from the larger reach truck into the trailer. There the pallet is hand unloaded for shipment.

In this department extruded treads pass through a 220-foot cooling tank, enter a skiver, and are then cut into sections. The skiver cuts the beveled edge which makes smooth lapping of the tread onto a circular tire possible. After being individually weighed, ten sections are loaded on a book, and these are temporarily stacked on a wheeled rack. From here the fork trucks transport them to the permanent racks in the nearby storage area.

Prior to the adoption of the powered fork trucks, the wheeled, three-tiered racks were used both for loading the books at the scales and for permanent storage. Once loaded, the racks would be moved by hydraulic hand trucks to the storage area. Then, when a single book was needed at the tire-building machine, one or two men would work one off the rack by hand onto a hand truck and wheel it into the production department. Because a single book weighs about 1,000 pounds they could not be stacked higher than three tiers—as high as a man can reach.

Five tiers extending almost to the ceiling are now stacked on the two rows of permanently fixed racks. A truck can move along between the racks, select a book, remove it, and easily carry it to the production department. One of these units delivering a book to the tire-building machine is shown in Figure 2.

Because of the increased storage capacity available, production can now schedule longer orders, thus save on set-up time. This has become an important operational factor because of the many different types of tires now marketed by Mansfield under a number of different brand names.

The variety of items Mansfield Tire produces complicates warehousing as well as production. In the two warehouses where mechanized handling equipment is used, a total of three Reach Fork trucks handle the finished tires on pallets that can be stacked ceiling high (Figure 3). Clamp trucks are used to move stacks of truck and tractor tires too large to be palletized. Seven smaller units (five of which are hand-hydraulic) maneuver loaded pallets into and out of freight cars and trucks, and on the dock area. This is shown in Figure 4.

The revised handling system in the warehouses now enables three tires, instead of one and a half, to be stored on a square foot of floor space.

To solve the problem of accessibility, (piles that are too high make tires at the bottom hard or impossible to reach), tier-type pallets are utilized. An arched framework, mounted on each of the 50-tire pallets, is high enough to clear the stack of tires, and strong enough to support two loaded pallets above it. As tires are delivered to the warehouse by truck from nearby production buildings, they are off-loaded onto these pallets by hand. The pallets can be moved directly into the trailer by the smaller fork lift trucks as it is emptied.

For shipment out of the warehouse, pallet-loads of tires are taken directly to the loading dock. There a powered Raymond Walkie and hand-hydraulic trucks can carry them into the vehicles for off-loading by hand and lacing—a term referring to the way tires are arranged for shipment. They are not stacked, but set at varying angles to utilize the empty hole space. More fit into a trailer this way.

A similar system in the production department's receiving area makes use of a truck to remove goods from arriving trailer trucks and convey them to storage space which is nearby. In both the warehouse and production set-ups, mechanization has reduced this loading and unloading time by about one-half. What else has been gained?

Time and cost studies indicate an *annual* saving, over previous methods, equal to the initial cost of the fork lift trucks purchased.

A Laboratory Report on . . .

Quality Control Testing of Permanent Gaskets

Unique test procedures ensure the quality of the rubber components used in compression-type joints

By R. E. RISLEY and R. L. MINTZ
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Dresser Industries, Inc.
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UNLIKE most rubber products, the gaskets used in pipe joints are expected to have an indefinite service life, remaining functional as long as the pipe itself. Because the performance of a compression-type coupling is dependent in large part upon the quality of the rubber component, this application is one of the most exacting of all for rubber. The critical service conditions found in city distribution systems handling natural gas—where leaks cannot be tolerated—illustrate one aspect of the quality that is required. But in addition to service underground, similar permanent pack couplings are used on pumps, blowers, locomotives, and compressors where constant vibration is present, and on industrial furnaces, and in chemical and petroleum installations where other, but equally rigorous conditions exist.

The net result is that over the years quality control has become more of a religion than a watchword with Dresser Manufacturing Division, which originated and has manufactured, since 1880, rubber-packed pipe joining and repair devices.

Over the years, a number of unique tests have been developed by Dresser to give assurance that the coupling gasket material meets all the requirements of these exacting applications.

Figure 1 shows a cutaway of a typical coupling. The wedge-shaped rubber gaskets are compressed between the flange, the pipe, and the end of the middle ring by bolts. Bolt tension will be from 3,000 to 5,000 pounds per bolt, putting the gasket under a pressure of 2,000 to 3,000 psi. This construction allows the pipe to flex, and to move lengthwise, so that the

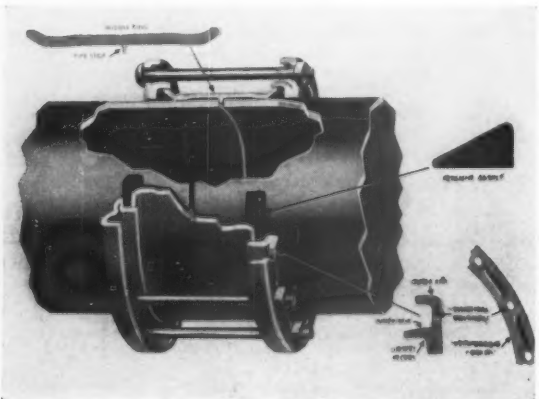

FIG. 1—Cutaway drawing of a typical compression-type coupling.

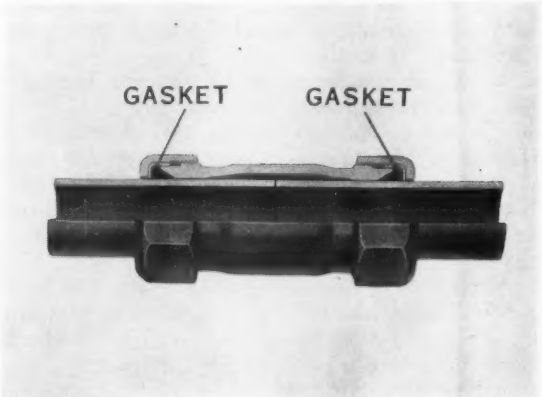

FIG. 2—Smaller size coupling with end nuts rather than bolts.

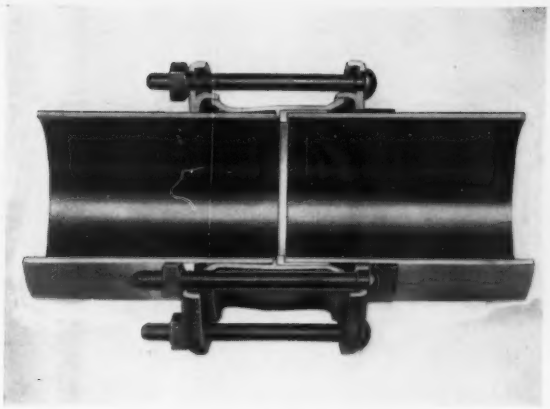

FIG. 3—Close-up of coupling that provides insulation.

FIG. 4—Brass spring, molded in, gives conductivity.

forces caused by subsidence, expansion and contraction are absorbed by the movement of the pipe in this flexible pipe coupling. Figure 2 shows a similar coupling made in smaller sizes. End nuts compress the gasket, and bolts are not used.

Figure 3 shows the construction of an insulating coupling, a type that provides electrical insulation between the pipes being joined. Should the joint require high electrical conductivity, gaskets such as those shown in Figure 4 are used. In some applications, the pipe joint must have extremely low electrical resistance, while other applications call for an electrically insulating joint.

Since this product is used in all climates, the gasket material must be flexible at Arctic temperature yet resist the sunlight and temperature resulting from exposure to a tropical climate. This type of joint is used to handle gas, water, oils and chemicals, so that the gasket materials must be resistant chemically to all of these materials, as well as resisting any deterioration in storage. Both gasket and pipe joint are expected to last as long as the pipe itself.

The gasket must be tough and have high tear resistance because of the rough handling it may receive prior to installation. Because of the high gasket pressure, the gasket must have high resistance to compression set. The gasket material must be non-blooming. The blooming of sulphur or any crystalline material will cause gas leakage, and blooming of wax will cause dust and dirt to adhere to the gasket surface.

The gasket must be non-bleeding. The loss of any compounding ingredients such as oils or waxes under the high compression pressure may affect the volume of the gasket and its chemical properties. It must also be heat-resistant up to the temperature of boiling water, and must withstand boiling in water without change in physical or chemical properties.

Maintenance of these characteristics in the rubber has made it necessary to develop some test procedures not ordinarily used. Standard tests are used wherever possible but, in some cases where standard test procedures are not adequate, Dresser Manufacturing Division has devised its own testing methods.

Some standard testing procedures such as those for determining tensile-strength and elongation are of value to the rubber compounder and molder but have no functional value in the product itself. Simple functional tests have been developed by Dresser which are practical and effective. These testing procedures will be described.

Special Test Methods

Figure 5 shows the compression-set test fixture. This is an ASTM type fixture but is used in a special way. The test pressure is much higher than in the standard test and in order to keep the spring of the fixture to a manageable size, the test button diameter is reduced proportionately. In designing the spring the largest practical diameter is used to maintain the platens parallel. Test buttons are placed under continuous spring load. The recovery reading must be measured in 15 seconds after removal from the fixture, and the requirement for percentage of recovery is severe. Compression set is measured thirty minutes after removal of the button from the fixture. The fixture is accurately loaded in a compression testing machine. Due to the importance of low compression set, this test is more severe and critical than the standard test.

Immersion tests for solvent resistance are made by submerging standard test buttons in the solvent a specified length of time and measuring the volume, weight and hardness changes. These tests are for comparative purposes only, and do not reflect the actual action of the material in the pipe line on the gasket.

Where the immersion test indicates the gasket may be damaged by the material in the line, a second type of test is made by assembling the coupling on a continuous piece of pipe and the space between the pipe and the middle ring is filled with the solvent being tested. This test solvent is removed and replaced

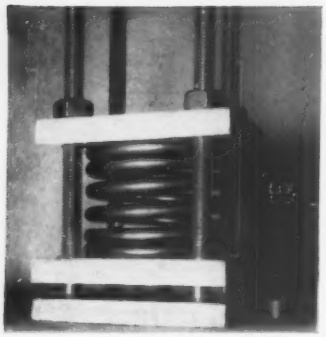

FIG. 5—Compression-set testing.

FIG. 6—Hand tear testing.

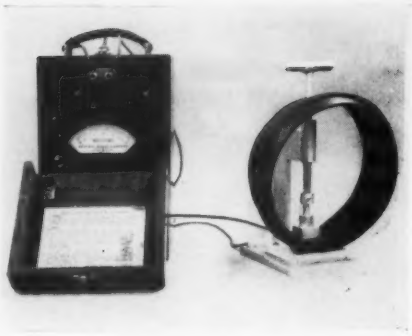

FIG. 7—Screening test for electrical insulation.

daily to keep it at full strength. After a period of several weeks of such testing, the coupling is dismantled, the gasket inspected and any possible damage evaluated. Tests of this kind are made with the condensate from manufactured gas, which is a mixture of aromatic oils. Fogging oil, used to humidify dry natural gas and to lubricate gas meters and similar equipment, is also tested for its action on the rubber gasket. Many such tests are made where the piping is to be used for handling refrigerants, chemicals, and fuels.

Some rubber compounds deteriorate or lose some of their ingredients when immersed in hot water, and become hard, brittle and useless. Compounds are tested for resistance to this by boiling samples in tap water for 48 hours. A compound which passes this test will last indefinitely in hot water service.

Our experience has been that the standard methods of determining tear resistance by use of the tensile test machine and standard specimens are not conclusive. The standard tests will give the properties of the compound, but do not give the tear properties of the product. We have found that the simple expedient of cutting a notch of standard size in a molded gasket and flexing it with the hands is an effective and simple means of testing. Any compound which breaks square across is rejected. Adequate tear resistance is achieved when the tear, if any, goes circumferentially or at right angles to the original notch. Figure 6 shows this crude but effective method of testing for tear resistance.

Electrical insulation in a pipe line is important where a section of the pipe is isolated to be put under cathodic protection for corrosion mitigation. Insulation also prevents the accumulation of substantial amounts of electric current, which otherwise would add from various sources, building up current of sufficient intensity to cause severe corrosion or possible injury to workmen doing maintenance work on the line. Figure 7 shows the apparatus for testing for electrical resistance. The thin skirt of an insulating gasket is compressed between two 1 inch square electrodes by spring pressure. The resistance is then measured by means of a megohmeter. This relatively simple test is used for screening. When this test indicates the electrical resistance may be less than ideal, two 6 inch gaskets are assembled in a coupling and the resistance across the joint is measured. This test gives the true resistance as the gaskets are being tested under service conditions.

For thawing water mains and for carrying electric current in a cathodic-protection system, the gasket must have good electric conductivity. This is achieved by molding a brass coil spring in the tip, as shown previously in Figure 4. Electric resistance is measured by assembling the coupling on a piece of pipe having a shot-blasted surface, and testing with an electrolysis volt ammeter. This test gives the resistance in millionths of an ohm. This equipment is shown in Figure 8.

It is a Dresser requirement that the gasket be capable of one year of indoor storage at ambient temperature without deterioration of any kind. The usual effect of age is surface checking or increase in hardness. Our experience has shown that gaskets stored under water have an infinite life. Various standard tests for aging have been tried, but we have been unable to correlate accelerated laboratory tests with actual results of exposure to the weather. The test for shelf-life properties is to bend a 6 inch molded gasket around a piece of 2 inch diameter pipe and tie the ends. This sample is left in the weather. After about two weeks, a defective compound will show small checks under a 20 power magnifying glass. Checking will occur sooner in the summer than in the winter.

Actually, shelf life of Dresser gaskets is much greater than the minimum specification under ordinary storage conditions, providing a satisfactory margin of safety. Under compression, in a coupling or pipe clamp, service life is infinite.

The test for bleeding or exudation is to bolt up samples of the gaskets in the coupling under heavy pressure and observe for loss of liquid ingredients for a period of one week.

It is sometimes necessary to determine the type of elastomer which has been used in making up the compound. Since all gaskets are about the same color and about the same specific gravity, it was necessary to find a simple means of telling nitrile rubber from natural or styrene rubber. It was found that a drop of turpentine on the surface of the natural or styrene

rubber instantly caused a slight temporary swelling, but a nitrile rubber compound was unaffected.

Neoprene is identified by cutting off a small sliver and burning it. Natural rubber will burn, whereas neoprene will not support combustion.

Butyl rubber is identified by immersing a small sample in sulphuric acid and sodium chromate. If the rubber is butyl, the color of the solution will remain orange-red; natural or nitrile rubber will turn the solution blue-green, due to oxidation of the rubber sample.

At extremely low temperatures, there is more breakage of underground pipe than under any other condition. For this reason, it is very important that any pipe repair device employing rubber gaskets should use a rubber which will be flexible and elastic at low temperatures. Satisfactory compounds were developed, but that left the problem of devising a test which would show that the rubber had adequate resilience at all temperatures, and finding a simple quality control means to know that this standard was being achieved.

It was determined that rubber increases in beam strength as it loses resiliency, and a measure of beam strength would give a satisfactory indication of resiliency. The apparatus shown in Figure 9 was designed and built. A sample .3 inch in diameter and 1.5 inches long is cut from a gasket. This is placed on the anvils of the test device, and pressure is applied at the center by the hand lever and spring shown. The specimen and the base of the instrument are placed in a beaker of dry ice and alcohol. The force required to deflect the beam is read as the temperature goes down. The dial indicator measures the distance of deflection of the rubber beam. The inch scale measures the compression of the spring which gives the force applied. Two thermometers, one with the bulb encased in rubber, measure the temperature. The thermometer bulb encased in rubber measures the central axis temperature of the specimen. The other thermometer measures the surface temperature of the specimen. This was found to be an unnecessary refinement in most cases and unless the differential is large the axis temperature only is read.

Readings are taken at 10°F. increments. The force-temperature at constant deflection is plotted on a chart and compared with a line which represents satisfactory performance. One rubber compound is available which loses no ingredients at low temperature and is flexible and resilient at temperatures of minus 60°F.

Standard Tests

Routine tests are run on hardness, specific gravity, compression and permanent set on every batch of rubber. These tests are a check to prove that the proper ingredients have been used in the batch and that the batch is the same compound as specified and the same as preceding batches.

Conclusion

It is believed that the use of rubber for pipe coupling gaskets is unusual in that so many properties are required. The fact that this application requires performance under extremely high pressure, must seal at temperatures from –60°F. to +212°F., may be stored for a year or more before being used, and is expected to maintain high gasket pressure for at least 50 years after being put into service, requires extreme care in manufacturing and quality control.

Quality control of rubber for this application requires constant checking with simple routine tests plus constant observation of functional and environmental tests. A well equipped rubber testing laboratory under the supervision of a rubber chemist provides assurance that the product will meet the requirements of the most critical user.

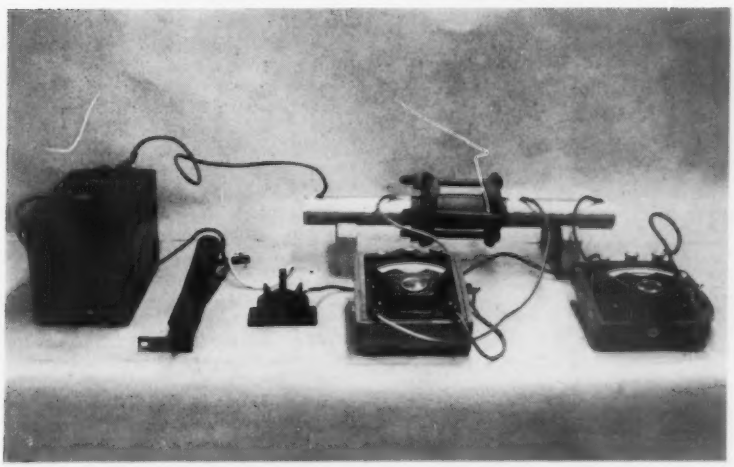

FIG. 8—Electrical conductivity test.

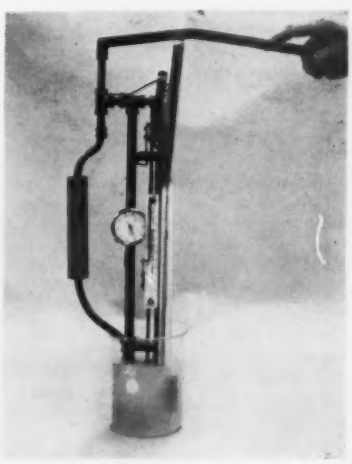

FIG. 9—Low temperature elasticity test.

Executive Compensation

in the Rubber Industry, 1959

► In a sharp upturn over 1958, the rubber industry showed greater growth in both sales and profits in 1959 than the average for 25 major industries. Rubber companies reported a 16 per cent rise in their sales and a 26 per cent increase in profits, as compared with an all-industry average of 9 per cent and 21 per cent, respectively.

And yet, the average compensation for chief executives of rubber companies edged upward only 0.4 per cent, a figure far under the 8 per cent growth for top executives in other industries. As a result, the rubber industry ranked 21st out of 25 leading industries in the growth in compensation of top managers, as shown in Table I. Only four industries—petroleum, electrical equipment, tobacco, and aircraft and missiles—placed below rubber in terms of percentage increases in compensation.

By DOUGLAS DE FOREST
McKinsey & Company, Inc.
New York 17, New York

These are the findings of a survey of top management compensation conducted by McKinsey & Company, management consultants. The 1960 survey, the sixth annual such review, covered 12 leading rubber companies, including both large and small concerns, out of a total of 605 companies in 25 important industry classifications. The survey also showed that even over a period of six years the growth in pay of chief executives in the rubber industry has not matched that of their peers in other industries.

The survey showed that the slight compensation drop that chief executives in all of industry experienced in 1958 has been reversed. In 1959 a sharp recovery took place with an annual gain of 8.0 per cent in compensation, the largest since the surveys began. The sharp change parallels a 9.0 per cent gain in sales and a 21.0 per cent increase in profits in all of industry.

All of these figures, of course, vary significantly from industry to industry, with automotive and electronics leading the pack. Automotive executive compensation rose 27 per cent for a 25 per cent increase in sales and a 95 per cent increase in profits. Electronics upped top executive pay 25 per cent for a 19 per cent increase in sales combined with a 30 per cent rise in profits. The aircraft and missiles industry's chief executive's compensation, on the other hand, dropped back 2 per cent, for sales down 2 per cent and profits off 33 per cent.

Rubber companies increased sales by 16 per cent, upped profits 26 per cent and were in the bottom quarter of all companies in rate of increase of chief executive's pay, up 0.4 per cent.

TABLE I—SUMMARY OF CHANGES IN COMPENSATION, SALES, AND PROFITS IN 25 INDUSTRIES—1959 OVER 1958

Industry	Average Percentage Change[1] Chief Executive Compensation	Industry Sales	Industry Profits
Automotive	27%	25%	95%
Electronics	24	19	30
Food	13	2	20
Chemicals	12	12	14
Business machines	12	12	9
Machinery (except electrical)	10	9	33
Building materials	10	5	29
Air transport	9	18	53
Textiles	8	19	103
Consumer durables (except auto)	8	16	62
Large diversified companies	7	18	26
Steel	7	11	4
Paper	6	15	21
Dept. stores, general mdse. chains	6	9	10
Industrial metal products	6	9	8
Non-ferrous metals	5	10	22
Railroads	4	2	(15)
Soap, cosmetics, pharmaceuticals	2	8	11
Public utilities	2	9	8
Food and drug chains	2	5	6
Rubber	0.4	16	26
Petroleum	0.3	7	9
Electrical equipment	(1)	20	38
Tobacco	(1)	6	8
Aircraft and missiles	(2)	(2)	(33)
All-industry average	**8%**	**9%**	**21%**
Number of industries recording increases	**22**	**24**	**23**

Note: Parentheses indicate negative change

The 1953-1959 Record

This survey was the first in which enough of a backlog of data was available for useful long-term comparisons. We found that between 1953 and 1959, the average company boosted its sales 43 per cent, profits rose 30 per cent, and during this period the average chief executive received a 16 per cent boost in pay. During this period sales in the rubber industry have increased 61 per cent but compensation has gone up only 7 per cent.

An interesting point that came out of the six-year study, however, is that new chief executives were chosen by a little over half of the companies in the survey, and on the whole these new top executives were paid less than their immediate predecessors. Thus chief executives who stayed on the job during the whole of the six-year period reported a 24 per cent rise in compensation which is again half the increase of the total sample.

The percentage of executive turnover ranged from 77 per cent in the electronics industry to 17 per cent in large diversified companies, with the average being 47 per cent, indicating that virtually half of the 516 companies for which data were available replaced their chief executive officer during the six years. The rubber industry replaced only 3 out of 12 chief executives during this period, a rate of 25 per cent.

In addition to growth in sales and profits as an indicator of compensation levels, sheer size alone is also an important factor. Thus, generally the top executive in a large company receives higher remuneration than one in a small concern, although there are important variations from one industry to another, as shown in Table II.

This exhibit shows that there is the greatest spread in compensation between large and small companies in the soap, cosmetic, and pharmaceutical industry and the least in the air transport field. Rubber ranks eighth, near the top of the list. Thus on a statistical trend line, the head of a company in the rubber industry with sales of $30 million would be paid $50,000 while the boss of a $400 million concern (13 times larger) would receive $131,000, or better than 2½ times as much.

Further evidence that size is the most important single criterion of top executive compensation in the rubber industry is shown by the finding that 91 per cent of the variations in remuneration between one rubber company and another can be explained in terms of size alone. In this respect, the rubber industry leads all others, with steel and tobacco ranking second and third. On the other end of the scale, in the air transport industry less than 10 per cent of the variations can be explained in terms of size and therefore other factors are much more important.

TABLE II—COMPENSATION OF CHIEF EXECUTIVES AT SELECTED POINTS ON THEIR INDUSTRY TREND LINES
(000 omitted)

Industry	Compensation in Companies According to Size (Net Sales) $30 million	$100 million	$400 million	Difference Between High and Low
Soaps, cosmetics, pharmaceuticals	$66	$110	$196	130
Business machines	62	103	184	122
Steel	57	95	171	114
Non-ferrous metals	66	103	169	103
Large diversified companies	—	140	168	—
Chemicals	57	92	160	103
Building materials	59	90	149	90
Tobacco	70	102	157	87
Automotive	58	88	142	84
Aircraft and missiles	59	86	134	75
Consumer durables (except auto)	65	92	136	71
Paper	63	89	134	71
Electrical equipment	57	82	126	69
Department stores, gen'l. merchandise chains	54	78	122	68
Electronics	68	94	135	67
Public utilities	53	77	120	67
Petroleum	66	92	131	65
Machinery (except electrical)	65	90	130	65
Railroads	55	78	118	63
Food	55	76	110	55
Industrial metal products	74	96	128	54
Textiles	71	89	115	44
Food and drug chains	78	95	121	43
Air transport	64	70	78	14
All industries	**$61**	**$88**	**$133**	**72**

Lower Echelons

As we might expect, the compensation of second, third, and fourth level executives tends to move with that of the top manager. In this respect, in the rubber industry the compensation of the second and third echelons of management as a percentage of the top managers' earnings is higher than the average for all industries, as shown in Figure 1. Only the fourth level of rubber company management does not, on the average, receive more pay as a percentage of top management compensation than the all-industry average.

Traditionally, second, third, and fourth level executives in the rubber industry have earned more than their peers in other industries. In fact, during the last four years, only in 1958 was this not the case. However, the fact that in comparison with chief executives in the rubber industry second and third line managers receive proportionately more than their peers in other industries does not necessarily mean that they are earning more money. At least in part, the higher ratio in the rubber industry is due to the lower growth rate of chief executive compensation.

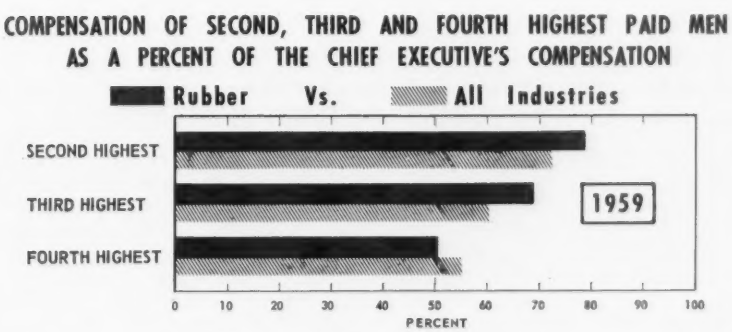
COMPENSATION OF SECOND, THIRD AND FOURTH HIGHEST PAID MEN AS A PERCENT OF THE CHIEF EXECUTIVE'S COMPENSATION
Rubber Vs. All Industries
SECOND HIGHEST
THIRD HIGHEST
FOURTH HIGHEST
1959
0 10 20 30 40 50 60 70 80 90 100
PERCENT

FIG. 1—Compensation of the second, third, and fourth highest paid executive, calculated as a percentage of the chief executive's compensation, 1959.

Each year McKinsey and Company, management consultants, conducts an annual survey of executive compensation in American industry. This survey covering the year 1959 is based on data obtained from 605 firms in 25 industrial classifications.

This is the fourth year that RUBBER AGE has published the results as they pertain particularly to the rubber industry. The analysis of rubber industry statistics is interpreted from the responses of 12 leading rubber firms, including both large and small companies.

EDITORIAL

Who's Keeping Score?

► Congressman John Brademas (Dem., Ind.) has asked that the Bureau of the Census keep better track of imported rubber footwear. Representative Brademas points out that without detailed statistics showing exactly what is being imported into the country, the domestic footwear industry is seriously handicapped in proving to the Tariff Commission that its products are "like or directly competitive" with the import.

As the Census Bureau does not keep detailed breakdowns on imports of rubber footwear by type, no domestic manufacturer is able to prove to the satisfaction of the Tariff Commission that imports are harming the domestic industry. Representative Brademas suggests that separate tallies be kept on the various types of rubber shoes, rubber-soled shoes, boots, gaiters, etc., which are coming into the United States.

We are of the opinion that the Representative's request is reasonable and we hope that the Bureau of the Census will institute a program whereby domestic footwear manufacturers will be able to determine precisely where they stand in relation to imports. Certainly, this is one service which the government should be able to provide.

While the Tariff Commission has measures providing for the relief of grievances, there is virtually no way for the domestic manufacturer to prove that such grievances do, indeed, exist.

Domestic manufacturers of rubber footwear have been trodding a slippery path for some time now and it behooves the Census Bureau and the Tariff Commission to provide a better footing for producers.

ASTM Committee D-11 Meets in Atlantic City on June 27-30

► Committee D-11 on Rubber and Rubberlike Materials of the American Society for Testing Materials and 22 of its subcommittees met on June 27 to 30, 1961, during the 64th Annual Meeting of ASTM at the Chalfonte - Haddon Hall, Atlantic, City, N. J.

Simon Collier (Quality Control Consultant), chairman of D-11, and J. J. Allen (Firestone), secretary of D-11, were both honored by the parent body. Mr. Collier was named to Honorary Membership in ASTM, the society's top award to a member. His award was in recognition of long and notable contributions to the society in both technical and administrative activities, especially for eminent leadership and work in the fields of rubber and rubberlike materials, and quality control.

Mr. Allen was given the society's Award of Merit in recognition of long and effective services to the society in technical committee, district, and administrative activities, and especially for work in Committee D-11 on Rubber and Rubberlike Materials.

Report on ISO/TC45

D-11 met on June 30 and, in addition to hearing subcommittee reports, heard a report by R. D. Stiehler (National Bureau of Standards), chairman of the American Group of ISO/TC45 on Rubber and Rubber Products, on the ninth meeting of the international organization, held on May 8 to 13, 1961, in Milan, Italy. There were 96 delegates at the meeting representing 11 countries, including France, Germany, Hungary, Italy, Netherlands, Poland, Sweden, Switzerland, United Kingdom, United States, and the Soviet Union.

The eight members of the American Group, representing the United States, were: J. J. Allen (Firestone), N. L. Catton (DuPont), W. A. Frye (Inland Mfg.), B. S. Garvey (Pennsalt), J. C. Montermoso (Quartermaster Corp, U. S. Army), T. H. Rogers (Goodyear), R. H. Taylor (Scott Testers), and Dr. Stiehler.

Meetings were held by all 11 working groups. Dr. Garvey was the convener of Working Group C on Physical Tests of Unvulcanized Rubber, and Mr. Taylor was the convener of Working Group D on Physical Tests of Vulcanized Rubber.

According to Dr. Steihler, of the 11 working groups established at the eighth meeting of ISO-TC45 in New York, only one dealt with products. At the Milan meeting it was agreed, after extensive discussion, to increase the number of working groups to 13. The two new additions will be devoted to products, namely rubber hose (United Kingdom convener) and industrial rubber footwear (Germany convener). United States representation on these new working groups has not yet been decided.

In order to speed up the work of ISO/TC45, it was decided to hold meetings every year. To keep travel at a minimum, the working groups were requested to handle their work mainly by correspondence and to hold meetings with ISO/TC45 only when their work had developed to a point that a meeting would be productive. Dr. Stiehler announced that the 10th meeting of ISO/TC45 will be held in London, England, within one week of the IRI International Rubber Conference on May 21 to 25, 1962. Sweden has invited ISO/TC45 to meet in Stockholm in June of 1963.

Paper Presented

At the D-11 meeting, a paper on "Evaluation of H-Test Method for Adhesion of Tire Cord to Rubber" was presented by Roy H. Moult, senior scientist, Resins and Adhesives Group, Koppers Co., Verona, Penna., and William I. Martin, statistical consultant, Mathematics Group, Koppers Co., Monroeville, Penna. H. G. Bimmerman (DuPont), vice-chairman of D-11, served as program chairman.

Both authors participated in the presentation, with Mr. Moult describing the test methods and apparatus used and Mr. Martin giving the statistical analysis of the test results. It was pointed out that an organized study was made of the effects of various factors found to

ASTM Changing Its Name

► The American Society for Testing Materials will change its name to American Society for Testing *and* Materials. Approval to change the society's name was given by the membership at the 64th Annual Meeting of ASTM on June 27, 1961, in Atlantic City, N. J. The society will adopt the new name after court approval in Philadelphia, Penna., where the society is chartered. The name change was recommended by the ASTM board of directors with the explanation that the former name appears to give the impression of limiting ASTM's activities to testing, whereas the scope is considerably wider.

Simon Collier, left, chairman of ASTM Committee D-11, is presented with a certificate naming him to Honorary Membership in ASTM by Dr. A. A. Bates, right, retiring president of the Society.

be present in the H-test method for adhesion of tire cord to rubber. Variations due to temperature of testing, size of specimen, age of molded specimen, testing speed, slot size, position in the mold, day-to-day and mold - to - mold differences, and sampling of the dipped cord were all evaluated. According to the authors, a specific set of operating conditions and sample layout were selected which enabled the test to distinguish average differences as small as 1.70 and 1.65 pounds between two dipped rayon and nylon cords, respectively.

Object of H-Test

It was explained that although an object of the H-test method is to determine an adhesion value, the true adhesion is not actually measured by such a rupture test. The H-test can only measure the weakest link in the bond system. Mr. Moult stated that when a cord is pulled out of a block of rubber, the failure of the bonded system may take place cohesively in the rubber substrate, in the adhesive film, or in the cord itself. In addition, adhesion failure may occur at the interface between the adhesive film and the rubber substrate, or between the adhesive film and the cord. He remarked that true rupture of the bond seldom, and perhaps never, takes place exclusively at either interface if a true bond has been established. Hence, the term "adhesion" is used loosely as an equivalent of the "strength of the adhesive joint."

According to Mr. Moult, the H-test is a method for the measurement of the force necessary to pull a single cord axially from a small block of rubber in which it is embedded. To simplify the operation, two small blocks of rubber are joined by an interconnecting cord to form a specimen which resembles the letter "H," thus characterizing the test.

The rayon tire cord used in the tests was Tyrex 1650 denier, 1100 filaments, twist 12.0 Z x 12.0 S. It was treated in a single-end latex dipping machine containing the following materials: Penacolite Resin R-2170, water, formaldehyde, caustic soda solution, styrene-butadiene latex 2006, and vinylpyridine terpolymer latex. The nylon tire cord, type 700, 840 denier, 12.0/12.0 ZS twist, was treated in the same formula as the rayon tire cord, with the exception of the styrene-butadiene latex 2006.

In his discussion of the statistical analysis of the H-tests, Mr. Martin stated that the standard statistical technique called the "Analysis of Variance" was used to analyze the results. He added that this technique permits the total amount of variation in the data to be separated out into its various components such as the sum of squares, degrees of freedom, mean square variance, "F" variance ratio test, and expected mean square.

The sources of variation were: between blocks, among days within blocks, between moldings within days, among cord slot, cord slots by block interaction, among cord samples, cord samples by block interaction, latin square residual, between cord pieces, among specimen rows, rows by blocks, rows by days within blocks, rows by moldings within days, and residual. Mr. Martin explained that statistical tables are available which enable one to make a decision as to whether or not a specific variation in the results is greater than one would expect from just random chance variation.

According to Mr. Martin, a study of the precision of the H-test showed the following: a definite row effect in the mold. The values obtained increased as one moved from the top of the mold to the bottom; a difference was noted in results obtained between the various cord slots; variations were found among the cord samples along the length of the 1200-foot dipped tire cord; and variations were noted between moldings made within a single day as well as between days.

New Subcommittee Chairmen

The following subcommittee chairman changes were announced:

G. H. Rogers (Goodyear) is chairman of Subcommittee 22 on Flexible Cellular Materials, succeeding L. A. Wohler (Firestone).

O. W. Lundstedt (U. S. Rubber) is chairman of Subcommittee 7 on Rubber Latices, succeeding G. H. Barnes (Goodyear).

C. E. Taylor (Goodyear) is chairman of Subcommittee 1 on Mechanical Rubber Hose, succeeding R. A. Bonnell (Goodyear).

E. G. Driscoll (Habirshaw Wire & Cable) is chairman of Subcommittee 5 on Insulated Wire and Cable, succeeding J. T. Blake (Simplex Wire & Cable).

R. G. Seaman *(Rubber World)* has resigned as chairman of Subcommittee 8 on Nomenclature and Definitions. His successor has not yet been named.

The next meeting of D-11 and its subcommittees will be held on February 7 to 9, 1962, in Dallas, Texas, during Committee Week of the American Society for Testing Materials.

Activities of the D-11 subcommittees follow:

Subcommittee 4—Protective Equipment for Electrical Workers (Gordon Thompson, Electrical Testing Labs., Inc., chairman): The subcommittee voted to retain the following test methods as standards: D-1049-59 (Rubber Insulator Hoods); D-1050-59 (Rubber Insulating Line Hose); and D-178-24 (Rubber Matting for Use Around Electric Apparatus). The following standards were referred to the proper subcommittee sections for study and recommendations for retention: D-1048-59 (Rubber Insulating Blankets) and D-1051-59 (Rubber Insulating Sleeves). The subcommittee decided that D-120-59T (Rubber Insulating Gloves) be advanced to standard and be recommended to the American Standards Association as an American standard. D-1700-57T (Low-Voltage Insulating Gloves) will remain as a tentative standard.

Subcommittee 5—Insulated Wire and Cable (John T. Blake, Simplex Wire & Cable Co., chairman): The subcommittee voted to letter ballot revisions made on D-1351-54T (Polyethylene Insulated Wire and Cable). There will also be letter ballots on a new specification covering a 60°C. PVC insulation and to withdraw D-734-50T (Insulated Wire and Cable: Vinyl Chloride Plastic Compound) as a standard; a new specification of a 75°C. PVC insulation; and new aging tests in D-752-57T (Heavy-Duty Black Neoprene Sheath for Wire and Cable) and D-753-57T (General Purpose Neoprene Sheath for Wire and Cable). It was voted to coordinate the developments in Subcommittee 15 on Life Tests for Rubber Products with the neoprene aging tests in Subcommittee 5's specifications. The subcommittee chairman announced the resignation of C. W. Pickells (Consolidated Edison of New York) as chairman of the Test Section.

Subcommittee 6—Packings (R. F. Anderson, B. F. Goodrich Co., chairman): The subcommittee resolved the three negative votes in the D-11 letter ballot on Specifications for Rubber Rings for Asbestos-Cement Pipe. Underwriters Laboratory's negative vote, requesting that oxygen bomb aging method replace the oven aging method, was overridden by the subcommittee. The remaining two negative votes, dealing with modulus and compression set requirements, were withdrawn with the understanding that the tables would be subject to review at a future date as more data is made available. The Rubber Ring Task Group is reviewing the Draft Proposal for Natural Rubber Rings for Joints in Asbestos-Cement Water Piping, developed by Working Group K of ISO/TC45. A proposed tentative method of test for Sealibility of Gasket Materials was presented to the subcommittee by George D'Olier (Raybestos-Manhattan). After discussion, the subcommittee voted to submit the method to D-11 for letter ballot.

Subcommittee 7—Rubber Latices (O. W. Lundstedt, U.S. Rubber Co., chairman): A review of the Milan ISO/TC45 meeting on latex was given. The subcommittee agreed that the capillary method for determining viscosity be deleted and a Brookfield LVF apparatus be used in its place. This new procedure will be submitted to D-11 for letter ballot.

The Newnham ZnO test report of the established task force indicated that the test is reproducible. No correlation of the test results with latex applications has been established. The subcommittee decided to review this situation again at next year's meeting.

A task group report on the correlation of methyl red end point with the indicated end point in determining alkalinity, in test method D-1076-57T (Test for Concentrated, Ammonia Preserved, Creamed and Contrifuged Natural Rubber Latex), shows that the pH method results in higher values. A task group was assigned to resolve this problem.

J. J. Allen (Firestone), right, secretary of ASTM Committee D-11, receives his Award of Merit certificate from Dr. A. A. Bates, left, retiring president of ASTM.

Subcommittee 8—Nomenclature and Definitions (R. G. Seaman, Rubber World, chairman): The subcommittee discussed the results of its D-11 letter ballot on the revision of the D-1566-60T (Definition of Terms Relating to Rubber and Rubberlike Materials) definition for rubber. No decision to override or resolve the nine negative votes could be reached and action was deferred until the next meeting. The proposed increase in the per cent set after extension-retraction from 10 to 50 per cent is considered as having failed to gain approval from D-11.

The chairman reported that Subcommittee 12 on Crude Natural Rubber voted to instruct its Task Group No. 1 to make the extension-retraction test on additional rubber and plastic materials considered to have per cent set values between 10 and 50 per cent, and to make a report at the February, 1962, meeting if possible. The two negative votes from the March 1961 10-11 letter ballot on the definition for "elastomer" were discussed. A motion to override these votes resulted in a tie so that this definition and these negative votes will be considered at the next meeting.

N. Catton (DuPont) reported on the May, 1961, meeting of ISO/TC45 Working Group L on Terminology. The group held an organization meeting and is requesting suggestions from member countries on how to proceed with its work. All member countries were also asked to provide any existing definitions for "elastomer," "rubber," and "vulcanization." Working Group L recognized the need for definitions that will separate "elastomers," "plastics," and "high polymers" and also that it has the responsibility to function as an arbitration and advisory group on terminology, and for interpretation for customs officials in various countries.

Subcommittee 9 — Insulating Tape (W. H. Meade, Boston Edison Co., chairman): The subcommittee discussed the results of the recent letter ballot on the addition of moisture resistance requirements to D-1373-57T (Ozone Resistant Rubber Insulating Tape). One negative vote was resolved by editorial changes. There was considerable discussion over the method of making water resistance measurements.

The first draft of a butyl insulating tape specification was discussed, as were the test results on materials compounded by Mr. Smith of Enjay. It was the consensus of opinion that manufacturers should consider the formula suggested by Mr. Smith and, if feasible, make factory samples.

A task group was appointed by the chairman to review the test method for moisture resistance measurements for both of these specifications and to make suggestions for revision. This group will not only review the test methods but also the formulae presented, and report at the next meeting.

Subcommittee 10—Physical Testing of Rubber Products (L. V. Cooper, Firestone Tire & Rubber Co., chairman): The following actions were taken by the subcommittee: To conform with E-171-60T (Standard Atmospheres for Conditioning and Testing Materials) the standard temperature in D-412-51T (Tension Testing of Vulcanized Rubber) was changed to 23°C. ± 1°C. D-412-51T, as re-written, will be submitted to D-11 for letter ballot.

Harry G. Bimmerman (DuPont), on left, chairman of the D-11 technical program on evaluation and testing of tire cord adhesion, confers with the speakers, William I. Martin (Koppers), center, and Roy H. Moult (Koppers), on right.

The negative vote on the 25 per cent standard deflection change in D-395-55 (Compression Set of Vulcanized Rubber) was overridden.

D-1415-56T (International Standard Hardness of Vulcanized Natural and Synthetic Rubbers) will be re-written to include the Microhardness Tester, and D-11 will be letter balloted on the re-written method. D-1415-56T will be retained as a tentative.

The subcommittee requested D-11 to recommend to ASTM that the report of William King (Acushnet) on the use of a single deflection in D-395-55 be published as a STP.

D-1456-57T (Strain Testing of Vulcanized Rubber) was advanced to standard.

ISO/TC45 requested that the Delft Tear Test be included in the subcommittee's study of tear tests, and that some work be done on gas permeability of rubber.

Subcommittee 11—Chemical Analysis of Rubber Products (W. P. Tyler, B. F. Goodrich Co., chairman): The statistical analysis of the testing program on bound styrene and IIR determination in rubber compounds will be letter balloted in the subcommittee as an addition to the appropriate sections in D-297-59T (Chemical Analysis of Rubber Products). Discussion was held on nitrogen determination in crude natural rubber, and the subcommittee will submit to Subcommittee 12 on Crude Natural Rubber procedures based on the British Standards method.

Subcommittee 12—Crude Natural Rubber (L. G. Mason, B. F. Goodrich Co., chairman): Three negative votes in the D-11 letter ballot on the addition of a procedure for nitrogen determination in D-1278-58T (Chemical Analysis of Natural Rubber) resulted in a further modification of the nitrogen procedure. The modification will be letter balloted in D-11, and the disputed nitrogen procedure will be withdrawn from the 1961 D-11 annual report.

C. J. Glaser (Lee Tire), liaison contact with the RMA Crude Rubber Committee, reported that a second draft of a new edition of the "Book of International Type Descriptions and Specifications for Natural Rubber" has been circulated to participating organizations.

Ralph Wolf (Natural Rubber Bureau) estimated that the use of Technically Classified rubber is increasing in the United States. He remarked that a listing of packing houses in Malaya having TC rubber is available from the Bureau.

Subcommittee 12 voted to request Subcommittee 11 on Chemical analysis of Rubber Products to try and reconcile the differences between the D-11 and ISO/TC45 methods for the determination of iron in natural rubber.

Subcommittee 13—Synthetic Elastomers (B. S. Garvey, Jr., Pennsalt Chemicals Corp., chairman): A correction table for use in the determination of oil in the 1600 and 1800 series of SBR will be letter balloted in both Subcommittee 13 and D-11.

Accelerator level test formulae for furnace black masterbatches will be letter balloted concurrently in Subcommittee 13, Subcommittee 29 on Compounding Ingredients, and D-11.

An editorial change dealing with the measurement of surface tension in low viscosity latices was adopted in the revision of Section 8(a) in D-1417-57T (Synthetic Rubber Latices).

A proposed revision of the procedure for assigning SBR numbers will be letter balloted in Subcommittee 13. The letter ballot will include a revision of Table II in D-1419-58T (Description of Types of Styrene-Butadiene Rubbers).

Subcommittee 13 requested Subcommittee 28 on Statistical Quality Control for: statistical procedures for conducting interlaboratory tests; definitions for repeatability and reproducibility; and procedures for analyzing data to get values for repeatability and reproducibility.

Subcommittee 15—Life Tests for Rubber Products (G. C. Maassen, R. T. Vanderbilt Co., chairman): A specification on Tubular Oven Aging will be submitted to D-11 for letter ballot. D-749-43T (Calibrating a Light Source Used for Accelerating the Deterioration of Rubber) and D-750-55T (Resistance to Accelerated Light Aging of Rubber Compounds) are being revised and will include the plastic chip method. The subcommittee recommended to D-11 that D-1630-59T (Abrasion Resistance of Rubber Soles and Heels) be advanced to standard.

Subcommittee 16—Classification and Specifications of Rubber Compounds (J. F. Kerscher, Goodyear Tire & Rubber Co., chairman): The results of the D-11 letter ballot on D-2000 (Classification System for Elastomeric Materials for Automotive Applications) were discussed. A proposal calling for an increase of 10 per cent after 70 hours at 212°F. in distilled water as a requirement for Suffix L of the AA grade compounds in D-2000, will be letter balloted.

Subcommittee 19—Rubber Materials in Liquids (M. F. Torrence, E. I. du Pont de Nemours & Co., chairman): A progress report was given on immersion testing at high temperatures. There was a recommendation that di-2 ethylhexyl sebacate +0.5 per cent phenothiazine be adopted as a standard test fluid in D-471-57T (Change in Properties of Elastomeric Vulcanizates Resulting from Immersion in Liquids). After establishing with the supplier a standard for uniformity and information for characterizing it in D-471-57T, it will be letter balloted in the subcommittee. The subcommittee decided to withhold advancing D-471-57T to standard, and to letter ballot it in D-11 with modifications suggested by ISO/TC45 and the inclusion of a diester test fluid, if the latter is approved by the subcommittee letter ballot.

Subcommittee 20—Adhesion Tests (P. J. Larsen, Lord Mfg. Co., chairman): The subcommittee discussed ISO/TC45 activity relative to D-429-58 (Adhesion of Vulcanized Rubber to Metal). D-428-58 A and B have been accepted by ISO/TC45 for draft proposal. Also discussed were the initial test results for the Lord Conical Method. The data indicated the necessity for more study and the securing of additional test data, specifically in the comparison of Lord test results with D-429-58A.

Subcommittee 21—Testing of Rubber Cements and Related Products (J. F. Anderson, B. F. Goodrich Co., chairman): A proposed tentative method of test for adhesion of vulcanized rubber to a single strand wire was approved in both Subcommittee 21 and D-11 letter ballots. Work is now under way to develop a method of test of adhesion of multiple strand cord to vulcanized rubber. The fourth draft of the H-Pull type test for measuring adhesion of textile cord to vulcanized rubber will be letter balloted in the subcommittee.

Subcommittee 22 — Flexible Cellular Materials (T. H. Rogers, Goodyear Tire & Rubber Co., chairman): The subcommittee voted to advance the following tentative methods to full standard: D-1055-59T (Specifications and Tests for Latex Foam Rubbers) and D-1056-59T (Specifications and Tests for Sponge and Expanded Cellular Rubber Products). The following will be retained as tentative methods: D-1564-59T (Specifications and Tests for Flexible Urethane Foams) and D-1667-59T (Specifications and Tests for Sponge Made from Closed Cell Polyvinyl-chloride, or Copolymers Thereof).

A specification and methods of test for

rubberized curled hair were reviewed by the subcommittee. It will be rewritten to include recommended changes and then letter balloted in the subcommittee.

Subcommittee 23—Hard Rubber (W. J. Dermody, Electric Storage Battery Co., chairman): A draft of a method for the classification of general purpose and special purpose hard rubber materials will be letter balloted in the subcommittee to determine whether the classification should be proposed to D-11 for inclusion in D-530-59T (Testing Hard Rubber Products) or be adopted as a separate standard. A revision of D-639-57T (Testing Asphalt Composition Battery Containers) was approved by subcommittee letter ballot and will be letter balloted in D-11. The subcommittee agreed to confine its future work to hard rubber methods and to exclude electrical tests except in so far as they apply to hard rubber.

Subcommittee 24—Rubber and Rubber-Like Coated Fabrics (K. L. Keene, U.S. Rubber Co., chairman): W. H. Bryan (DuPont) gave a progress report on the status of low temperature crack testing methods. Additional intra-laboratory tests will be conducted utilizing the modified WAD test jig and the low temperature brittleness tester specified in D-746-57T (Test for Brittleness Temperature of Plastics and Elastomers by Impact). The chairman reported on the Taber Abrasion round robin, and indicated that the method used was not suitable and would require further work.

Subcommittee 25—Low Temperature Tests for Rubber and Rubber-Like Materials (R. S. Havenhill, St. Joseph Lead Co., chairman): The subcommittee heard progress reports from task groups working on tests of low temperature coated fabric, and low temperature compression set. In the latter, the 25 per cent deflection method at low temperature gave lower results on soft stocks and higher results on hard stocks, than does the present method.

Subcommittee 26—Processability Tests (Rolla H. Taylor, Scott Testers, Inc., chairman): The chairman reported on the results of the D-11 letter ballot on advancing to standard of D-1646-59T (Viscosity and Curing Characteristics of Rubber by the Shearing Disk Viscometer). The one negative vote requested inclusion of the 48 groove rotor and to editorially modify the requirements for the film used with sticky materials. The subcommittee overrode the 48 groove rotor recommendation, but accepted the recommended wording with regard to the film to be specified.

After discussing the results of the subcommittee letter ballot on the proposed method of test for shrinkage, the chairman was authorized to recommend to D-11 that the method be editorially revised so that it applys only to SBR rubber, and be letter balloted.

The subcommittee heard reports on the effect of pneumatic pressure on the Mooney viscosity of high molecular weight rubbers, and on extrusion dies. The task group on extrusion dies will prepare a procedure for subcommittee letter ballot.

Subcommittee 27—Tests of Resilience (W. A. Frye, Inland Mfg. Div., GMC, chairman): Editorial changes in D-945-59 (Mechanical Properties of Elastomeric Vulcanizates Under Compressive or Shear Strains by the Mechanical Oscillograph) were reviewed. A task group was formed to investigate the inter-laboratory reproducibility of the Goodrich Flexometer method. D-623-58 (Compression Fatigue of Vulcanized Rubber) will be retained as a standard while the investigation proceeds.

Subcommittee 29 — Compounding Ingredients (A. E. Juve, B. F. Goodrich Co., chairman): The subcommittee reviewed the results of its letter ballot to revise D-15-58T (Sample Preparation for Physical Testing of Rubber Products) and to incorporate D-1522-58T (Testing Carbon Blacks in Rubber). Although there were only two negative ballots, many of the affirmative ballots contained valuable suggestions for corrections and clarification. The task group working on this matter was instructed to prepare a re-written report preparatory to letter balloting in D-11.

Task groups reported on the following work: storage stability results of Industry Reference Black No. 1; visual rating of the pigment dispersion in rubbers; the reconciling of the differences in the procedures for compounding, mixing, and curing butyl rubber as given in D-15-58T and those employed by the producers of butyl rubber; the use of a masterbatch procedure for mixing the natural rubber test formula for testing carbon blacks. It was recommended by the task group that an alternate mixing procedure employing a complete masterbatch, rubber plus all the ingredients except carbon black, be written into D-15-58T or D-1522-58T, whichever is appropriate.

Technical Committee on Automotive Rubber (R. C. Waters, General Motors Corp., chairman): The following changes were approved by Tech A letter ballot and submitted to ASTM and SAE: D-735-58T (Elastomer Compounds for Automotive Application), adding new grades in the Silicone Tables and bringing the tables up to date; a new format in the Materials Table of D-2000 (Classification System for Elastomeric Materials for Automotive Applications); additions of grades 2245A and 2255A to D-1170-59T (Nonmetallic Gasket Materials for General Automotive and Aeronautical Purposes). Additional changes in D-1170-59T are being letter balloted.

Subsections are working on specifications for: Heater Hose SAE 20R-3; a molded flexible radiator hose; a power steering hose; a nylon-dacron hydraulic brake hose; and an air conditioning hose for automobile refrigeration. A seal specification is being edited preparatory to letter ballot in Tech A.

"Finley, what's this I hear about your new resiliency testing method?"

Tire Excise Tax Signed Into Law

► President John F. Kennedy has signed into law the new highway financing bill which raises excise taxes on tires, inner tubes, and tread rubber. The new law, said to be designed to keep the interstate road building program on a pay-as-you-go basis, became effective on July 1, 1961. It raises taxes on tires from 8c to 10c a pound and on inner tubes from 9c to 10c a pound. The tax on tread rubber for recapping has been increased from 3c to 5c a pound, or 66 per cent. In keeping the increase to 2c a pound, the retreaders achieved something of a victory since the original proposal had called for the tax to be raised to 10c a pound or 233 per cent.

Industry spokesmen stated that the tax increase will be paid by the consumer. How much more tires will cost a consumer will depend on the weight of the tire casing. The tax on the popular 7.50 x 14 tire will increase by 53c, from the previous $1.81 to $2.34. The tax on a 9.00 x 14 tire will jump 48c, from $2.38 to $2.96.

In signing the new bill, the President said there were many honest differences of opinion over the proper way to finance the highway program and distribute the tax burden equitably. The rubber industry's plan was presented before the Senate Finance Committee by Ross R. Ormsby, president of the Rubber Manufacturers Association, and reported on in the July, 1961 issue of RUBBER AGE.

Goodyear Butyl Tire

► Goodyear Tire & Rubber Co., Akron, Ohio, has a new quiet-riding, bump-absorbing automobile tire said to "whisper" around corners on any pavement. The company states that the butyl rubber used in the manufacture of the tire is responsible for its squeal-free performance. Special rubber compounds, a new tread design and a balanced construction concept in the tire body are used to take maximum advantage of the butyl characteristics. The tread design features five circumferential ribs in which zig-zag blading permits continuous road contact, providing improved traction and skid resistance. The company claims that the tire offers superior stopping ability and a tighter grip on turns, in addition to a quiet, smooth ride.

Goodyear Planning Major Expansion

► The Goodyear Tire & Rubber Co. will spend $180 million in its capital expenditure program for 1961 and 1962, reported E. J. Thomas, board chairman, at a press conference on July 24 in New York City. The expenditure, largest two-year capital investment program in the company's history, includes the new tire plants in Texas and Turkey, expansions of foreign plants, an addition to the Akron Research Laboratory, and modernization of domestic facilities.

Commenting on Goodyear's earnings outlook for the first six months of 1961, Mr. Thomas predicted that volume will be off from a comparable period last year, but earnings should present a rather respectable showing reflecting the organization's efforts to counteract rising costs, and the benefits of modernization expenditures. He predicted that renewal tire sales in the last six months of 1961 will surpass both those of the last six months of 1960 and the first six months of 1961.

As for original equipment, Mr. Thomas declared that after the third quarter down time for model changes, he would expect a strong fourth quarter of car and truck production with probably 1,700,000 to 1,800,000 car units. This would be close to 1960's fourth quarter heavy production. Goodyear's non-tire business should also improve in the next six months, Mr. Thomas said.

In 1962, he expects the renewal and original equipment business to be higher than in 1961 for auto, truck, and farm tires. Industry replacement car tire sales in 1962 should rise to 73 or 74 million units, and truck tire replacement sales for 1962 should be a little above this year's 9 million units, according to the Goodyear executive.

Mr. Thomas also stated that total new rubber consumption in the United States will probably reach 1,485,000 tons in 1961, only about 70,000 tons below last year, while the figure for 1962 is now estimated at 1,600,000 tons. Of the total amount of new rubber consumed, he predicts about 72 per cent will be synthetic rubber.

The Goodyear board chairman announced that the firm's new synthetic rubber plant at Beaumont, Texas, will start production of Budene and Natsyn stereospecific rubbers by the end of 1961. He also reported that all of the firm's international plants are running at capacity and should continue to operate at capacity for the next six months.

Baltimore Hearing For Oil-Extended Dispute

► A Federal judge in Baltimore, Md., ruled that the oil-extended rubber patent suit between the Firestone Tire & Rubber Co. and the General Tire & Rubber Co. should be heard in the U. S. District Court in Baltimore. General Tire, the defendant, had asked that the case be transferred to Ohio. Federal Judge R. Dorsey Watkins also denied a motion by General Tire to dismiss the Firestone suit, and ruled that General Tire could not press actions filed elsewhere.

Firestone, joined by one of its customers, McCreary Tire & Rubber Co. of Indiana, Penna., sued General Tire on April 4, 1961, challenging a patent granted General Tire in December, 1960, on oil-extended rubber for tires. Firestone claims that General Tire had done work on the oil-extended rubber under a Government research contract, and because of this contract the public already had paid for the rubber development. In its suit, Firestone stated that to pay a royalty to General Tire "in effect would mean a second payment by the public."

General Tire, who had won its patent after long litigation, followed by suing Firestone in Cleveland, Ohio Federal Court, charging patent infringement. General Tire previously had filed similar action against Goodyear Tire & Rubber Co. and the U.S. Rubber Co.

UCC Develops Compound

► A fusible silicone rubber compound, designed for fabricating electrical insulating tapes, has been developed by the Silicones Division of Union Carbide Corp., New York, N. Y. Called K-1628, the new material offers a high modulus—110 psi at 100 per cent elongation—which makes it possible to apply tape by machine wrapping. The high modulus reportedly prevents over-stretching to insure greater uniformity during coil wrapping, thus providing better insulation. In addition, K-1628 is pre-conditioned for almost immediate use, which reduces the need for plasticizing. The company reports that it has high green strength, which permits increases in extrusion rates and manufacturing output by as much as 100 per cent over other available fusible compounds. Tapes made of K-1628 have a smooth, glossy surface and high tack, binding readily to itself, but not tacky to the touch.

New Acme-Hamilton Unit

► Acme - Hamilton Manufacturing Corp., New York, N. Y., will consolidate its manufacturing facilities in a new plant in Trenton, N. J. When completed later this year, the 10-acre plant, containing 400,000 square feet of production space, will be one of the most highly automated in the industry. The company estimates that the consolidation will reduce overhead expenses, raw materials inventory requirements and duplication of operations, resulting in savings of $1,000,000 annually. The company also reported the introduction of six new rubber products, including an unsinkable swimming pool hose, a crush-proof industrial hose, a reinforced automotive radiator hose, and a longer-lasting conveyor belting. The company stated that these developments, together with its withdrawal from the unprofitable retail furniture field, would place the company in an improved earnings position.

Named by Southern Latex

► Three regional sales managers have been named by the Southern Latex Corp., Austell, Ga. Gaillard A. Mervin has been appointed to the North Carolina area, Robert E. Mann will handle the north Georgia area, and E. Reilly Scott will be responsible for the Southwest territory. Mr. Mervin has been with Southern Latex since 1954 and has served as a technical sales representative. He will be located in Concord, N. C. Mr. Mann was associated with Naugatuck Chemical in Gastonia, N. C., before joining Southern Latex in 1960 as a sales representative. He will maintain headquarters in Dalton, Ga. Mr. Scott has been with South Latex since 1950, and has served as chief chemist and technical sales representative. His offices will be located in Austell, Ga.

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URW and Mohawk Reach Agreement

► Mohawk Rubber Co., Akron, Ohio, and Local Six of the United Rubber Workers have reached an agreement on a new contract that matches the pattern set in earlier negotiations with other rubber companies. The new contract, covering 600 employees, includes a wage increase of 14½c an hour over a two-year period, improvement in the Supplemental Unemployment Benefit (SUB) program, an eighth paid holiday, and liberalized vacation benefits.

Hourly employment will get a 7½c an hour wage increase the first year of the contract and 7c an hour the second year. The agreement runs to June 12, 1963. Employees with 22 years' service will get 4 weeks' vacation. Those with 10 years' service qualify to 3 weeks vacation. Previous requirement was 25 years for 4 weeks and 11 years for 3 weeks.

Open Armstrong Talks

On July 10, the URW started new company-wide contract negotiations with the Armstrong Rubber Co., West Haven, Conn. The talks will cover 2,500 employees at Armstrong Rubber plants in West Haven and Norwalk, Conn., Des Moines, Iowa, and Natchez, Miss.

Dayco Offers Laminates

► Improved urethane foams called Dayco Foam Laminates, reported to be suitable for laminating with a wide variety of fabrics by fusion, adhesive or quilting techniques, is available from the Dayco Corp., Dayton, Ohio. The new line consists of all three types of urethane foam laminates — polyester, polyether, and a new, soft, open cell type known as Velvet Foam. They are said to resist dry-cleaning fluids, have good tensile strength, are quick-drying, non-allergenic, nontoxic, flame retardant, odorless, and resistant to mildew.

Batesville Unit On Stream

► Batesville Rubber Co. has gone into production at its new $1.4 million plant at Batesville, Ark. The unit manufactures heels, soles, and tire retreading materials. More than 600 items will be produced in the shoe products operation.

W. L. Batty, Jr.

J. H. Morrison

Named to G-E West Coast Posts

► The Silicone Products Department of General Electric Co., Waterford, N. Y., has appointed W. L. Batty, Jr. to the post of manager of its Western district, and has named James H. Morrison sales representative for the district. They will have their headquarters at Downey, Calif. Mr. Batty holds a B.A. degree in chemistry from Dartmouth College and attended the Yale University Graduate School of Industrial Administration. He was associated with the Mallinckrodt Chemical Works prior to joining the G-E Silicone Products Department in 1952 as a sales representative in the New England district. Since 1959, he has been based in Waterford where, until his present assignment, he served as a product planning and sales development specialist in the rubber market development unit of the Silicone Products Department.

Mr. Morrison holds a B.S. degree in chemistry from the University of California in Los Angeles. Prior to joining G-E in May, 1961, he was associated with the Chemical Division of Goodyear Tire & Rubber Co. as a sales representative. He also worked as a development chemist in Goodyear's Tire Division, and as chief chemist with Kirkhill Rubber Co., where he was directly associated with silicone rubber fabrication.

Curing Tube Developed

► Goodyear Tire & Rubber Co. has developed a new curing tube said to increase efficiency and reduce tire retreading costs. The flexible tube requires only six pounds of pressure to collapse it, the company reports, compared with 25 pounds for regular curing tubes, and delivers up to 25 per cent more cures than ordinary curing tubes. Goodyear states that development of a special compound is responsible for the tube's flexibility. Built-in lubricants eliminate the task of painting the tube after every three cures, while improved antioxidants in the rubber eliminate the need for putting glycerine inside the tube every 50 cures.

Davidson Erects Plant

► Davidson Rubber Co., Dover, N. H., has constructed a 100,000 square foot facility in the Dover Industrial Park, which will house the company's offices and laboratory, as well as production facilities. Products being produced are made from urethane foam bonded to a vinyl plastisol skin. These include arm rests, visors, crash pads, assist bars, and other interior trim and safety parts.

► The new Jefferson Chemical Co. propylene plant at Conroe, Texas, has started to produce polypropylene glycols for the urethane industry.

RMA Molded and Extruded Division Holds Annual Meeting on June 26-28

► The Annual Meeting of the Molded and Extruded Products Division of the Rubber Manufacturers Association held on June 26 to 28 at the Greenbrier, White Sulphur Springs, West Va., attracted over 100 persons. The meeting got underway on the morning of June 26th under the chairmanship of Howard W. Smith (Pawling Rubber). The first speaker was W. James Sears, vice-president of RMA and chairman of its Public Affairs Committee. Mr. Sears offered his appraisal of the "New Frontier" and its implications to the rubber manufacturing industry.

Following Mr. Sears' address, the Honorable William H. Ayres, Representative of the 14th Ohio Congressional District, discussed legislation now being pressed in the Congress and what this legislation holds in store for the rubber industry.

The next speaker on the program was William F. Butler, vice-president of the Chase Manhattan Bank, who spoke on "The Economic Outlook." He was followed on the program by C. Richard Dowd, manager of the Management Services Division of Ernst & Ernst, who devoted himself to the subject "Keys to Profits in the Sixties."

Three Seminars Held

The second day of the meeting was devoted to seminars on three subjects of interest to rubber manufacturers. F. J. Carter, vice-president of the Goodyear Tire & Rubber Co., conducted one seminar on "The Current Labor Negotiations — An Appraisal." J. C. Richards, vice-president—sales for the B.F. Goodrich Industrial Products Co. conducted a seminar on "Planning and Programming with Your Salesmen," while Mr. Dowd conducted a seminar on "The Internal Profit Squeeze." The seminars were so arranged that those in attendance could participate in any two. Summations of all the seminars were presented at the third day of the meeting, June 28. At this time there was an opportunity for members in the audience to present views and ask questions of the seminar leaders.

Annual Business Meeting

At a business meeting which followed, members had an opportunity to review the initial draft of the group's forthcoming handbook on Acceptable Quality Levels. A special AQL drafting committee has been at work on the manual since spring of 1960. The editing task force was headed by Frank V. Smith (Clevite Harris). This work and a new section on hard rubber products will be published in final form as a part of the RMA handbook entitled "Specifications for Molded, Extruded, Lathe-Cut and Chemically Blown Sponge Rubber Products," which is now being revised by several drafting subcommittees under the direction of Harry Dinmore (Tyer Rubber).

Edward Welch, RMA secretary, reported on the current status of the Food Additives Amendment of 1958 to the Federal Food, Drug and Cosmetic Act. He also discussed industry participation in the United States Department of Commerce Trade Center in London, England and on the recent meeting of International Standards Organization Technical Committee 45 on Rubber.

In addition to the business activities, a full schedule of social affairs was planned. At a banquet held on the evening of June 27, prizes were awarded to winners of various sporting events.

Program Committee

Edward F. Callanan (Clevite Harris) served as chairman of the Program Committee which also included Glenn B. Pore (Barr Rubber Products), E. W. Quiggle (Garlock), Louis R. Jacobs (Premier Rubber Mfg.), Pierce Sperry (Sperry Rubber & Plastics) and Richard Strasser (Western Rubber). Mr. Quiggle served as chairman of the golf tournament while Mr. and Mrs. Strasser handled the ladies' program.

The head table at the banquet held by the Molded and Extruded Products Division of the RMA. Seated, left to right, are: H. C. Sommer (General Tire); Mrs. H. W. Smith; Edward Welch (RMA); Mrs. E. F. Callanan; H. W. Smith (Pawling Rubber), division chairman; Mrs. H. C. Sommer; E. F. Callanan (Clevite Harris); and Mrs. Edward Welch.

RMA Warns Retreaders

► The Retread and Repair Materials Committee of the Rubber Manufacturers Association has cautioned retreaders against placing too much confidence in retread designs which "depart too drastically from those which have been tested and proved satisfactory in the new tire field." The RMA stressed the importance of using proved tire tread designs which new tire design engineers develop after millions of miles of testing. The RMA particularly warned against the "economy" designs now receiving so much attention by retreaders. "New tire testing, new tire requirements, and new tire performance, must be the yardsticks for determining the acceptability of designs used in retreading tires for today's modern automobiles," the RMA maintains.

National Phoenix Merges

► Shareholders of National Phoenix Industries, Inc., New York, N. Y., have approved the merger of the company into Great American Industries, Inc., Meriden, Conn. Under the terms of the agreement, Great American will exchange 2.25 of its shares for each share of National Phoenix.

B. S. Garvey, Jr.

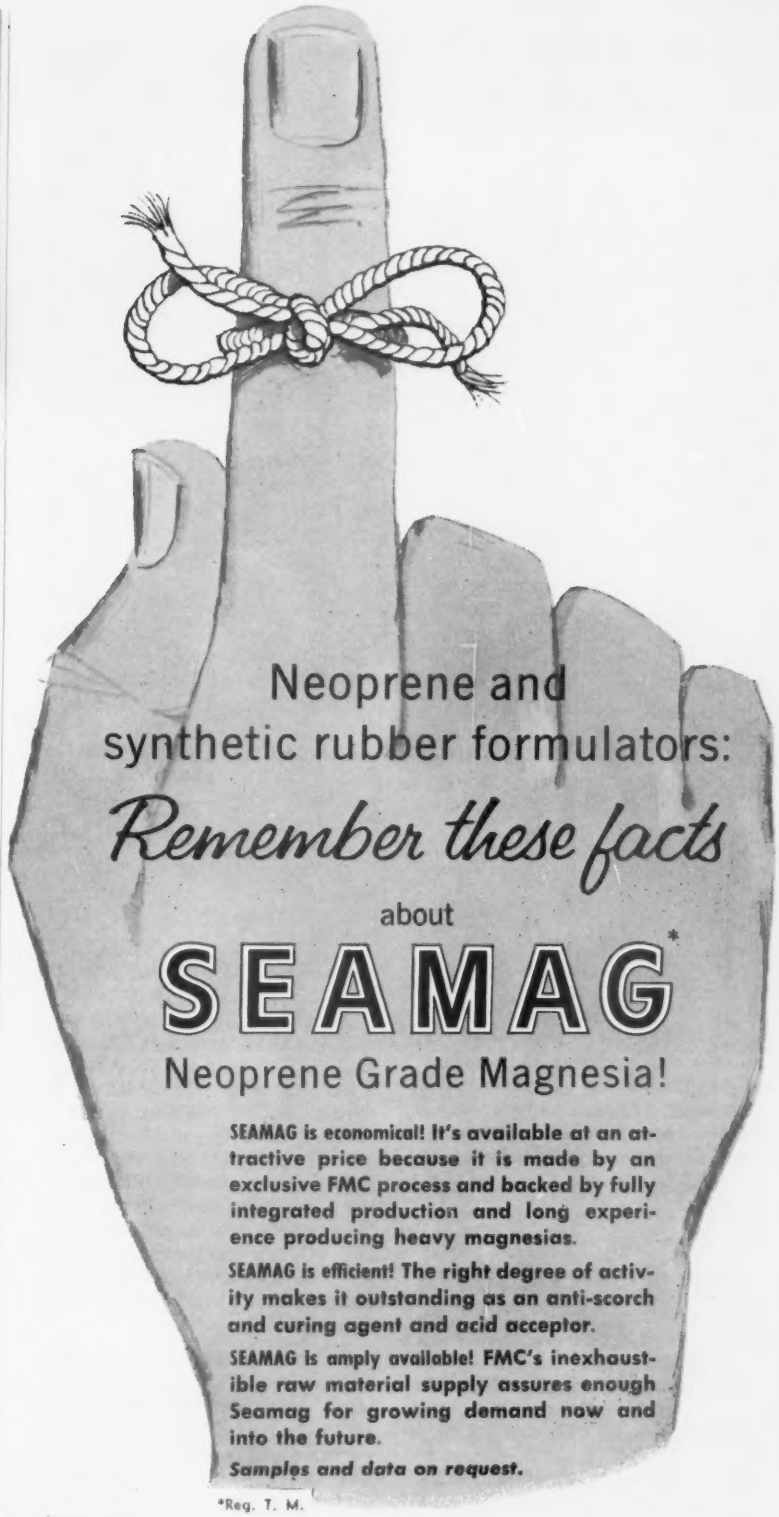
Named by Pennsalt

► Dr. Benjamin S. Garvey, Jr. has been named manager of rubber chemicals at the Pennsalt Chemical Corp., Philadelphia, Penna., succeeding the late George J. Klein. In his new post, Dr. Garvey will be responsible for rubber chemical sales and for technical service to the rubber industry. He will be located at the firm's new technical service laboratories in King of Prussia, Penna.

Dr. Garvey served as a chemistry instructor in China from 1921 to 1925 and later served in the same capacity at the University of Illinois. In 1927, after receiving his Ph.D. degree in organic chemistry from Harvard University, he joined the B. F. Goodrich Co. and, during the following 20 years, held various research and technical management positions there. In 1947, he joined Sharples Chemicals Inc. as director of sales service for rubber chemicals and remained there when the firm merged with Pennsalt in 1952.

A holder of several patents on rubber processing technology, Dr. Garvey served on various technical committees in the Government synthetic rubber program during World War II. He also served as consultant to the Research and Development Board, Department of Defense, from 1948 to 1951. In May, 1951, he was awarded a Certificate of Appreciation for Patriotic Civilian Defense by the U. S. Army.

Dr. Garvey is a past chairman of the ACS Division of Rubber Chemistry, and has also served in various executive capacities for the Akron and Philadelphia Sections of the American Chemical Society. He is a member of the American Institute of Chemical Engineers, the American Association for the Advancement of Science, the American Chemical Society, and the American Society for Testing Materials.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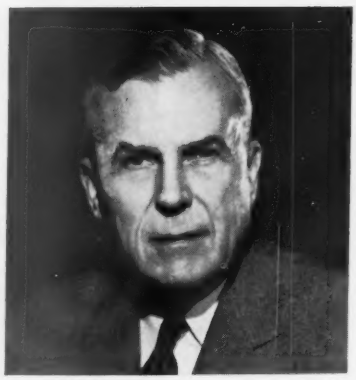
Goodyear Heavy Tires

► Goodyear Tire & Rubber Co., Akron, Ohio, has developed a "muck and mire" tire for use on agricultural and transport vehicles, and a new method of truck tire construction that is said to reduce operating heat sharply while increasing mileage and tire life. The new agricultural tire, featuring a special tread pattern that increases its mud-trotting ability, is being used on a number of transport vehicles in sugar cane fields, on agricultural sprayers and on wagons that haul cane to railcars. An addition to the company's Terra-Tire line, the tire measures 44 inches high and 40 inches wide. The company states that because of wide distribution of their extremely low inflation pressure—they require only six pounds of air per square inch in wet weather and ten pounds in dry —they virtually "float" over mud.

The new method of truck tire construction uses two separate rubber compounds in the tread which, the company states, will result in a jump of at least 5 per cent in mileage and a reduction of 25 per cent in operating heat. The dual-compound process is said to offer a cooler running compound in an area where heat buildup has been a basic problem. Goodyear reports that it has compounded the road-contact area of the tread to resist wear, and the inner or "flex" part of the tread to reduce heat buildup. Because the new construction method is stiffer and more resilient than the outer tread, and cuts down on flexing, it reduces the operating temperatures of the tires, thereby minimizing tread separation and loss of strength in the tire body. Special equipment has been developed to make the dual-rubber tread practical on a production basis.

Cosden Units On Stream

► Cosden Petroleum Corp., Big Spring, Texas, has completed two new styrene units designed to increase Cosden's capacity from 20 million to more than 60 million pounds annually. The styrene facilities are located directly adjacent to the original unit. They include additional facilities for styrene monomer production and an Alkar Unit which supplies the additional ethylbenzene required for the styrene unit through a process of catalytic alkylation of benzene with ethylene.



F. W. Stavely

Retires from Firestone

► Dr. F. W. Stavely, who directed the discovery of stereospecific synthetic rubbers for the Firestone Tire & Rubber Co., Akron, Ohio, has retired as director of research. His duties have been assumed by Ernest T. Handley, formerly executive vice-president of the Plastics and Synthetic Fibers Division (RUBBER AGE, February, 1961). Dr. Stavely received his B.A. degree in 1916 from Sterling College, and his M.A. degree the following year from the University of Chicago. He earned his doctorate in organic chemistry from the University of Chicago in 1922, and joined Firestone shortly thereafter.

After serving as manager of the Laboratory and Development Departments for the Firestone Tire & Rubber Co. of California from 1928 to 1933, he returned to Akron as a technical sales representative. He rejoined the California division in 1935 as manager of truck and tractor tire sales, and three years later became personnel director for the parent company. During World War II he was manager of fuel cell and oil cell development, and in 1945 he was appointed director of chemical and physical research laboratories.

Dr. Stavely's insistence on exploring the use of alkali metals as catalysts led to the discovery of Coral synthetic rubber, the polyisoprene rubber which was the first successful laboratory synthesis of the natural rubber structure and which is said to be a complete replacement for natural rubber. This line of research also led to the discovery of Diene, a polybutadiene rubber which, according to Firestone, improves the quality of natural rubber in blends.

Badger Offering Process

► Badger Manufacturing Co., Cambridge, Mass., is offering a new extraction process which reportedly offers exceptional advantages in the production of high-purity isobutylene, polymers of isobutylene, or the removal of isobutylene from other olefins. The process is being sublicensed by Badger through the Compagnie Francaise de Raffinage (CFR), discoverer of the process. The process scheme calls for the contacting of feed and solvent, phase separation, stripping of solvent, and redistillation of isobutylene for purity. Since there is no butane contamination of product, according to Badger, further fractionation is not required. Steps requiring reconcentration or repurification of the solvent are also eliminated.

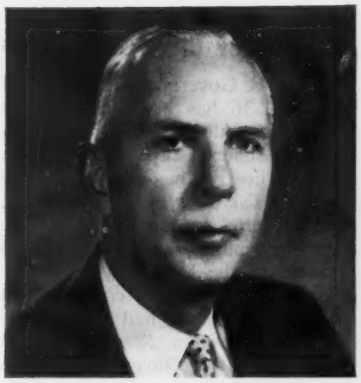
The company states that without the distillation and purification steps required by other methods, both investment and plant operating costs are substantially reduced. Advantages claimed for the process in C_4 olefin processing are: minimum losses to polymer formation; high yields of exceptionally pure isobutylene product; production of raffinate of very low isobutylene content; and easy processing of feeds high in butadiene.

Soviet Journal Available

► The Rubber and Plastics Research Association of Great Britain has prepared a cover-to-cover translation of *Plasticheskie Massy, (Soviet Plastics)*, the monthly journal of the Soviet plastics industry. *Soviet Plastics* is published under the plan sponsored by the British Department of Scientific and Industrial Research for cover-to-cover translations of important Russian journals. Subscriptions are available from Rubber and Technical Press, Ltd., Gaywood House, Great Peter St., London, S.W. 1, England, at a cost of $60 a year.

DuPont Expands Unit

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., will expand the output of titanium dioxide pigment at its New Johnsonville, Tenn., plant by 30 per cent within the next 12 months. Construction of additional facilities is the first step in a planned program of major expansions at the plant, which began operations early in 1959.



H. G. Bimmerman

Retires from DuPont

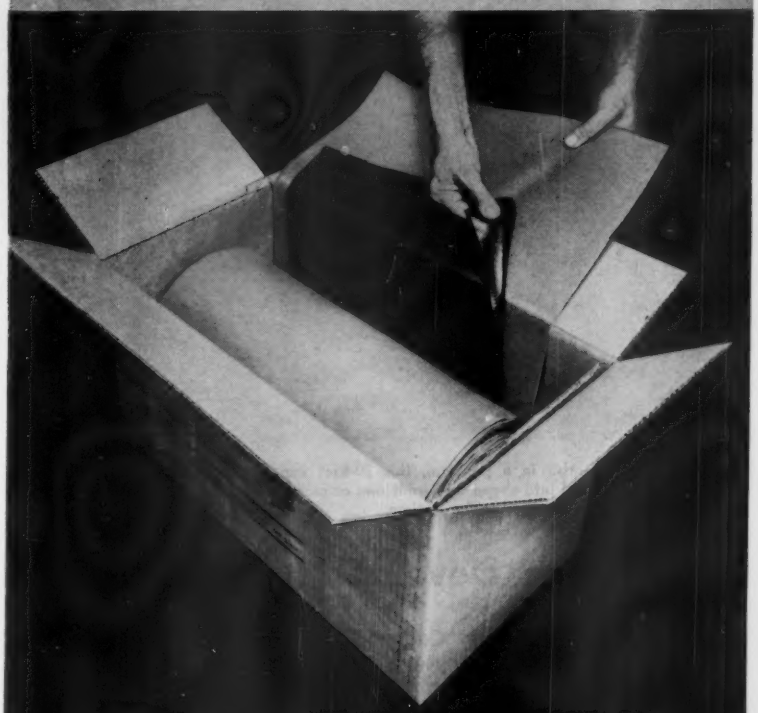
► Harry G. Bimmerman, manager of the rubber chemicals section of the Elastomer Chemicals Department of E. I. du Pont de Nemours & Co., retired on July 31, 1961, after 33 years with the company. A native of Bonham, Texas, Mr. Bimmerman received his B.S. degree in chemical engineering from the Agricultural and Mechanical College of Texas in 1922. Prior to joining DuPont in 1928 as a chemist and rubber compounder, he was associated with the American Cotton Oil Co. and the Miller Rubber Co. In 1941, he was appointed director of DuPont's Rubber Laboratory and, in 1959, was named manager of the rubber chemicals section of the Elastomer Chemicals Department.

During his career as a rubber chemist, Mr. Bimmerman has made many contributions to the advancement of the technology of the industry, particularly in the fields of mechanical rubber goods, blown sponge, and mold lubricants. A member of the ACS Rubber Division and vice-chairman of ASTM Committee D-11 on Rubber, Mr. Bimmerman has been active in the establishment of standard test methods for use in the rubber industry.

Chemigum 520 Latex

► Goodyear Tire & Rubber Co., Akron, Ohio, has developed a new synthetic rubber latex specially tailored for use in textiles and nonwoven fabrics, such as paper towels, napkins and tablecloths. The new material is known as Chemigum 520 and will be produced in the Chemical Division's recently-expanded facilities. The company states that with improved binder materials such as Chemigum 520, it is possible to design individual fabrics for specific end uses.

2 useful services...



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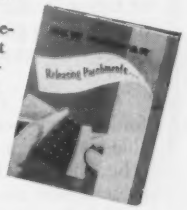

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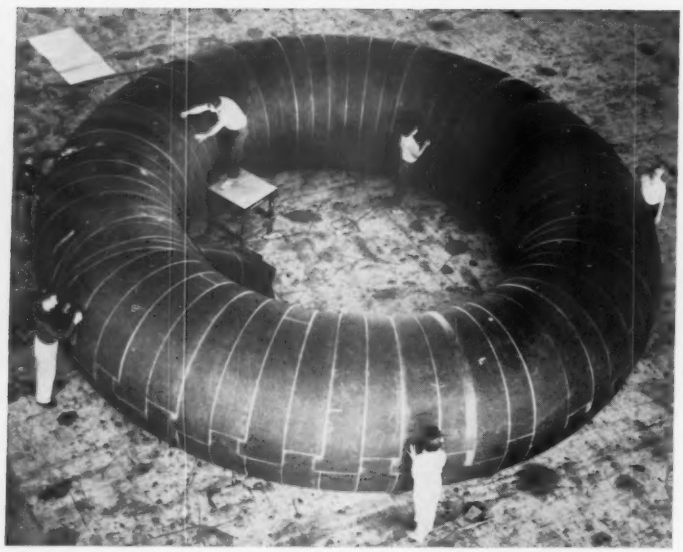


Boosted into orbit in a package, this 30-foot expandable instant space station could be inflated into shape to permit one or more persons to live and work inside the tube for an extended perior of time.

Goodyear Develops Space Station

► Goodyear Aircraft Corp., Akron, Ohio, has developed a relatively new technology which utilizes expandable structures to form large, light-weight space vehicles. The company has expressed the opinion that if the go-ahead were given today, the United States could have a manned space station in orbit in approximately three years, using presently known techniques and equipment. The GAC manned space stations would be doughnut-shaped structures 30 to 100 feet or larger in diameter, manned by one or more persons, and capable of use over an extended period of time.

The fabric stations would be folded and packaged into suitable containers for boosting into orbit, then inflated into shape. At present, the company is building a 24-foot expandable space station for National Aeronautics and Space Administration test use, as well as a second experimental space station, 30 feet in diameter, to be used for company research. According to GAC, tests conducted to date indicate that these structures could be used with existing boosters to perform missions which ordinarily would have to wait for the development of larger launch vehicles. Once in orbit, the station could be inflated or expanded into a pre-determined shape by pressure. Following inflation, if necessary, it would be possible to rigidize the structure by injecting a quick-setting, light-weight plastic between its walls. After performing a space mission, the company declared, an astronaut could utilize a re-entry capsule, or other means, to return to earth. With the development of rendezvous capabilities in space, the station could be manned continuously.

► Case Institute of Technology, Cleveland, Ohio, has started an Archive of Contemporary Science and Technology to house research manuscripts and records and other scientific materials from individuals and laboratories.

► Texas Gulf Sulphur Co., New York, N. Y., has prepared a revised edition of "Modern Sulphur Mining," which up-dates statistical data and discusses latest developments in production and distribution of the product.

Albert Sued for Taxes

► A U. S. Government tax claim of $363,852.36 has been filed against Sydney L. Albert, former president of the Bellanca Corp., Akron, Ohio. A civil hearing has been scheduled in U. S. Tax Court, Cleveland, Ohio, for the term starting June 19. The hearing centers largely on the 1956 income of the Lake City Malleable Co., one of the many companies in which Mr. Albert had an interest. Internal Revenue Service officials stated that the Government claim concerns transfers of assets from Lake City by Morrison Industries Inc., the Babcock Printing Press Co., Machinery Terminals Inc., Albert-Harris Inc., and Lake City Malleable Inc. According to IRS officials, the company from which assets were transferred has since been dissolved, but records show that Lake City Malleable Inc. is still in existence. The Government alleges that Albert was involved in the transfers and is liable for the total.

In April, Mr. Albert was accused in another Federal indictment in connection with alleged illegal stock operations. He is also involved in several civil suits growing out of the breaking up of his once-flourishing industrial empire, including a $26 million damage suit filed by the present management of the Bellanca Corp., which has recently changed its name to Olson Bros. Inc. The action is the result of Bellanca's acquisition of seven affiliated California firms which market eggs and egg products. The transaction resulted in the egg firms' gaining control of Bellanca and its sizeable tax losses, which can be credited to the new company's future earnings.

Polybutadiene Tire

► A premium passenger tire that contains polybutadiene synthetic rubber in the tread has been introduced by the U. S. Rubber Co., New York, N. Y. The company states that the tire, called the U. S. Royal Master, offers 60 per cent more mileage than first-line tires, due to the abrasion-resistance of the polybutadiene. This represents the first use of polybutadiene in passenger tires. The new polymer is blended with butadiene-styrene synthetic rubber, a conventional tire rubber. According to the company, the U. S. Royal Master has a four-row tread engineered for longer wear, greater resistance to skidding and better traction on all road surfaces than the tire it replaces.

Chrysler Buying Goodrich Tires

► Chrysler Corp., Detroit, Mich., reports that factory installed tires on its 1962 vehicles will be supplied by the B. F. Goodrich Co. and the Goodyear Tire & Rubber Co., with Goodyear remaining as the principal supplier. The automobile firm did not indicate what share of its tires business is going to Goodrich. For the past 30 years Chrysler has been using Goodyear tires almost exclusively.

Goodrich has been a long-time supplier to tires for Ford, American Motors, and General Motors. Goodyear is the only tire manufacturer supplying tires for all five automobile companies since it acquired a small percentage of General Motors business in the Fall of 1960.

Gurmatakis Appointed

► A. T. Gurmatakis has been named by the Phillips Petroleum International Corp. as regional manager of rubber chemicals and plastics sales for Latin America, with headquarters in Montevideo, Uruguay. Mr. Gurmatakis attended the University of Colorado. He joins Phillips with a background of 20 years in the rubber industry, 10 years of which have been in Uruguay, where he served as factory manager for Funsa Tire Rubber Manufacturing Co.

Rubbermaid Names Jones

► Rubbermaid Inc., Wooster, Ohio, has appointed Clyde Jones as acting manager of the Materials Research and Development Department, following the resignation of Vic Vodra, technical director of the firm. General supervision of this department, as well as engineering development, mold engineering and industrial engineering will continue to be the responsibility of Amos Neptune, manager of research and development.

Forms Consulting Service

► Robert Harrington has formed a consulting service, in Richland, Wash., specializing in the application of elastomers and plastics in the engineering, nuclear, industrial, and electrical fields. Mr. Harrington, author of several articles which have appeared in RUBBER AGE, is associated with the Hanford Laboratories operation of the General Electric Co.

A. F. Kingsley

Joins Neville Chemical

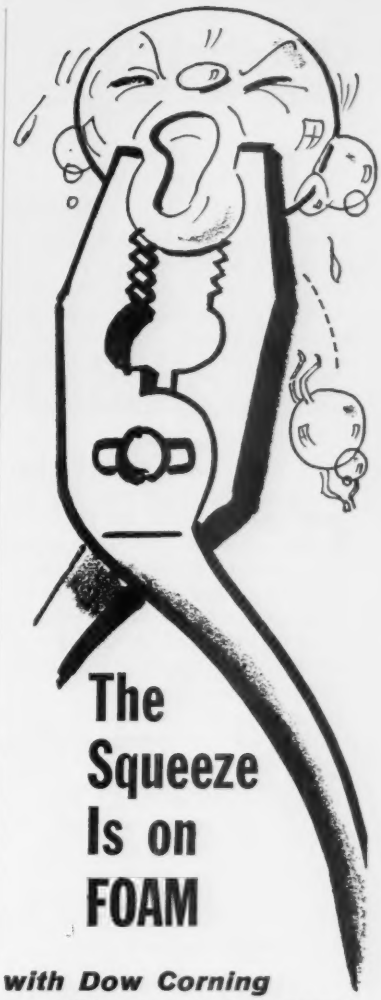
► Dr. Allan F. Kingsley, formerly head of the Analytical Research Department of Spencer Kellogg & Sons, has joined the Technical Division of the Neville Chemical Co., Pittsburgh, Penna., where he will be in charge of analytical activities. Dr. Kingsley attended the West Virginia Institute of Technology, where he received a B.S. degree in chemistry, a B.A. in Zoology and a M.A. degree in organic chemistry. He received his Ph.D. from Purdue University. Prior to joining Spencer Kellogg & Sons, Dr. Kingsley was associated with North Dakota University and the Electro-Metalergical Co.

Snell Offers New Service

► Foster D. Snell, Inc., New York, N. Y., is offering a new marketing service for the rubber and plastics industries. The service consists of abstracts of material from more than 200 prime marketing sources, such as trade journals, government documents, company bulletins, etc., which will contain significant marketing information about the industry here and abroad. The fee to subscribers for these Polymer Market Abstracts will be $36.00 annually.

Firestone Truck Tire

► An extra-wide truck tire, capable of replacing the dual tires currently used on trucks, has been placed in limited production by the Firestone Tire & Rubber Co., Akron, Ohio. The new Duplex, which has been in the development and engineering stages for more than three years, is designed to achieve savings to trucking firms through reduced inventories. Extra rims and wheel spacers also can be eliminated from inventories by the use of the new tires.



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Financial News

Dayco

► Six months ended April 30: A net loss of $6,219,806 was reported, against a net income of $586,292, or 45c per share, for the comparable fiscal period a year earlier. Net sales were $40,190,350, compared with $47,446,958 for the six-month period ended 1960.

Eagle-Picher

► Six months ended May 31: Net profit amounted to $1,186,714, equal to 58c per share, compared with a net profit of $2,090,001, or $1.01 per share, for the corresponding period of 1960. Net sales were $53,-239,899, against $62,340,797 for the comparable six-month period a year ago.

General Tire

► Six months ended May 31: Net income totaled $11,508,190, equal to $2.05 per share, compared with $11,236,964, or $2.01 per share, for the comparable period a year ago. Net sales amounted to $374,086,216, against $350,752,897 for the same period in 1960.

United Carbon

► First quarter: Net income was $1,645,744, equal to $1.25 per share, compared with $1,475,367, or $1.16 per share, for the comparable 1960 period. Net sales were $13,932,200, against $14,480,123 for the first quarter of the previous year.

American Zinc

► First quarter: A net loss of $322,-481 was reported, compared with a net income of $469,930, equal to 37c per share, for the same period a year ago. Net sales amounted to $11,575,875, against $12,936,228 for the first quarter of 1960.

Minnesota Mining

► First quarter: Net income was $16,489,082, equal to 32c per share, against $16,217,911, also equal to 32c per share, for the same period a year ago. Net sales reached $139,-680,358, against $128,669,218 for the first quarter of 1960.

Amerace

► Six months ended June 18: Net income amounted to $2,522,197, equal to $1.30 per share, compared with $923,396, or 47c per share, for the comparable period a year ago. Net sales reached $17,545,409, against $13,707,299 for the same six-month period of 1960.

Hercules Powder

► First half: Net sales and operating revenues amounted to $182,155,-315, compared with $166,643,274 for the corresponding period of 1960. Earnings on common stock were $1.45 a share, against $1.51 per share for the first six months of last year.

Johns-Manville

► First half: Net earnings amounted to $10,384,000, equal to $1.22 per share, compared with $13,510,000 or $1.59 per share, for the first half of the previous year. Sales were $173,076,000, against $174,326,000 for the first six months of 1960.

Allied Chemical

► First half: Net income amounted to $25,660,799, equal to $1.28 per share, compared with $30,884,894, or $1.55 per share, for the corresponding period a year ago. Net sales were $379,859,498, against $401,043,215 in the first half of 1960.

American Biltrite

► First quarter: Net income was $462,874, equal to 29c per share, compared with $641,886, or 41c per share, for the comparable period a year ago. Net sales totaled $19,677,-694, against $17,847,243 for the first quarter of 1960.

Goodrich

► First half: Net income was $15,-072,900, equal to $1.65 per share, compared with $18,177,093, or $2.02 per share, for the first half of 1960. Net sales amounted to $370,-356,606, against $403,820,831 for the corresponding period a year ago.

Stauffer Chemical

► First quarter: Net income of $3,-787,000, equal to 40c per share, compares with $5,048,000, or 54c per share, for the comparable period of 1960. Sales totaled $55,982,000, against $53,210,000 for the like period a year ago.

Nopco Chemical

► First quarter: Net income amounted to $442,169, equal to 40c per share, compared with $419,884, or 38c per share, for the same period in 1960. Net sales totaled $10,725,836, against $10,144,249 for the first quarter of the previous year.

Flintkote

► First quarter: Net income of $533,-616, equal to one cent per share, compares with $1,042,935, or ten cents per share, for the first quarter in 1960. Net sales amounted to $46,-503,676, against $49,871,944 for the same period a year ago.

Midland-Ross

► First quarter: Net income amounted to $606,734, equal to 61c per share, compared with $1,254,221, or $1.56 per share, for the same period a year ago. Net sales came to $23,-553,591, against $30,976,505 for the first quarter of 1960.

Carlisle Corp.

► First quarter: Net income amounted to $239,752, equal to 20c per share, compared with $351,239, or 30c per share, for the same period a year ago. Net sales came to $6,-050,837, against $6,389,574 for the first quarter of 1960.

Hewitt-Robbins

► First quarter: Net income amounted to $131,395, equal to 27c per share, compared with $110,554, or 25c per share, for the first quarter in 1960. Net sales were $8,949,607, against $11,800,372 for the same period a year ago.

Columbian Carbon

► First quarter: Earnings came to $2,456,000, equal to $1.09 per share, compared with $2,109,000, or $1.31, for the same period of 1960. Net sales amounted to $19,944,000, against $20,267,000 for the comparable period a year ago.

A. I. Ross

Elected Vice-President

► Arthur I. Ross has been elected a vice-president of the American Biltrite Rubber Co., Inc., Chelsea, Mass. Mr. Ross, formerly chief chemist of the Heel and Sole Division of American Biltrite, will be in charge of research and development for the Heel and Sole Division. A graduate of Northeastern University where he received his B.S. degree in chemical engineering, Mr. Ross has been with American Biltrite since 1919. He is a member of the American Chemical Society, past-chairman of the Boston Rubber Group, and present chairman of the Heel and Sole Technical Committee of the Rubber Manufacturers Association.

Davol Elects Carr

► Richard N. Carr has been elected president of the Davol Rubber Co., Providence, R. I., succeeding the late Dr. Ernest I. Kilcup. Mr. Carr attended Northeastern University and has been affiliated with Davol since 1922. In 1950, he was elected assistant secretary, and in 1955 he became factory manager. Mr. Carr has been vice-president and secretary of the company since 1957.

Release Agent Introduced

► Solusil-Ra, a release agent for rubber, plastics, glass and other materials, has been introduced by the Soluol Chemical Co., West Warwick, R. I. The company reports that the 35 per cent active silicone emulsion will prevent the build-up of polyurethane on rolls during the heat lamination process. The agent is applied by brushing or wiping directly onto the rolls.

TLARGI Holding Raffle

► The Los Angeles Rubber Group is raising funds for its educational program and would like its members and friends to support and participate in a drawing for a choice of one of three prizes. The choices are a 21-day vacation trip for two by sea and air to Tahiti-Moorea-Hawaii, or a 6" x 12" laboratory rubber mill of late design, donated by Rubber Equipment, Inc., El Monte, Calif., or $2,000 cash. Consolation prizes will be awarded. Ticket donations are $1.00 each, or $10.00 for a book of 12 tickets. The drawing will be held at TLARGI's Christmas Party on December 8, 1961, at the Beverly Hilton Hotel, Los Angeles, Calif. The winner need not be present. Donations, requests for tickets, and correspondence should be directed to L. E. Budnick, Ohio Rubber Co., 6700 Cherry Ave., Long Beach 5, Calif.

Hill Elected President

► Riverside Research Laboratory, Inc., Cambridge, Mass., has elected Dr. Henry A. Hill as president of the firm. Dr. Hill will direct a group of scientists and engineers in basic and applied chemical research. A graduate of the Johnson C. Smith University, with a B.S. degree, he received his doctorate in organic chemistry from the Massachusetts Institute of Technology in 1942. He was associated with Dewey and Almy Chemical Co. as group leader, and later joined Atlantic Research Associates as vice-president. From 1952 to 1956 he served successively as assistant manager and general manager of National Polychemicals, Inc. He had been vice-president of that firm since 1956.

Huber Builds Laboratory

► A new research laboratory and administration building for the Chemicals Division of J. M. Huber Corp., Havre de Grace, Md., is scheduled for completion by September, 1961. The structures will augment plant facilities devoted to the manufacture of chemicals and synthetic pigments for the rubber, paint, paper, ink, and pesticide industries. The facilities will house research, technical service and product evaluation laboratories, conference rooms, and libraries, and will occupy 32,000 square feet.

Ron Raymond

Named by United Carbon

► Ron Raymond has been appointed field representative for the United Carbon Co., Inc., Houston, Texas. He will work out of the Akron, Ohio, district sales office and will sell carbon black and black masterbatch. Mr. Raymond joined United Carbon in 1959 after graduating from the University of Texas. He recently completed, and is the first graduate of, an eight-month training program instituted by United Carbon to technically train its sales personnel so that they can better service their customers. Mr. Raymond is a member of the Akron Rubber Group.

MICSA Elects Officers

► The Midwest Industrial Chemical Salesmen's Association has elected its slate of officers for 1961-1962. The new officers are: *President*, Edward F. Lasek (Tennessee Products and Chemical); *Vice-president*, Paul Brna (George Lueders); *Secretary*, Raymond E. Champlin (Meer); and *Treasurer*, Robert W. Meidell (Charles Pfizer). The recently-organized group is a professional chemical salesman's association founded for the purpose of fostering selling efficiency and encouraging the highest ethical sales procedures.

G-E Opens Dayton Office

► The Silicone Products Department of the General Electric Co. has opened a new sales office in Dayton, Ohio, located at 11 West Monument Street. James Hamlin, formerly located in the company's Cleveland, Ohio, district office, is the sales representative in charge of the new Dayton office.

West Coast News

► "TLARGI Desert Holiday" was the theme of the Annual Summer Outing of the Los Angeles Rubber Group, held on June 9, 10, and 11 at the Stardust Hotel in Las Vegas, Nevada. C. M. Churchill (Naugatuck Chemical) and Roger Murphy (Citizens National Bank), acted as co-chairmen of this year's outing. As in the past, a golf tournament, tennis matches, swimming contests and a number of other athletic contests were scheduled. The following members served on the Desert Outing Committee: *Reservations*, Gene Ostman (Byron Jackson); *Housing*, Carl Hoglund (R. D. Abbott); *Transportation*, Larry Bruce (Naugatuck Chemical); *Sports Activities*, Walt Kearney (Firestone) and Bill Tefft (Union Carbide); and *Entertainment*, Bill Scheuermann, Prizes (Plastic & Rubber Products) and Frank Celiberti (Naugatuck Chemical). Approximately 350 TLARGI members and their guests attended the outing.

► A new company has been formed, Scientific Rubber Co., Huntington Beach, Calif., which will specialize in rubber-to-metal bonding, as well as in molded goods, sheet stock, and custom color mixing for the aircraft and missile industries. The company is headed by Cliff Hutter, president, and Laurence Justen. Mr. Hutter was formerly chief chemist at Stoner Rubber Co. and at Reeves Rubber Co. He has been in the rubber industry for the past 24 years. Mr. Justen was associated with Stoner Rubber Co. as purchasing agent. He has a total of ten years' experience in various phases of molded and calendered rubber products.

► Kenneth E. Quick, a partner in Pike and Quick Associates, Sunnyvale, Calif., has been appointed sales representative in metropolitan San Francisco and the northern California area for the Day Sales Co., Minneapolis, Minn. Mr. Quick, according to Day Sales Co., is a veteran application engineer in the fields of industrial dust control, pneumatic conveying and bulk material storage, with 27 years of experience in these fields.

► According to Raymond C. Firestone, president of the Firestone Tire & Rubber Co., California is the biggest tire market in the United States, with more cars than in 21 other states combined. Speaking at a recent meeting of company dealers in San Francisco, Calif., Mr. Firestone pointed out that this means $145 million in passenger tire sales and $45 million in truck tire sales in 1961 in California. The Firestone executive predicted that the tire industry as a whole can expect the biggest year in its history in 1962. Citing record replacement tire sales this year as a prime factor, he remarked that 71 million replacement passenger tires would be sold in 1961. According to Mr. Firestone, increased production of automobiles and trucks in 1962, combined with a record of more than 70 million vehicles already on the road, will push tire sales to a new peak in 1962.

► Plastic & Rubber Products Co., Los Angeles, Calif., has appointed Joe Hoefle as Los Angeles sales manager. In his new assignment, he will be responsible for the supervision and training of all Los Angeles sales representatives. Mr. Hoefle has been associated with the rubber industry for 20 years, and has served as sales engineer for Plastic & Rubber Products for the past 13 years.

► Jack L. Nece has been appointed director of sales for the Kirkhill Rubber Co., Brea, Calif. Mr. Nece, who has a 25-year background in rubber and plastics, has been a member of the Kirkhill Rubber sales staff for the past five years. In his new assignment, he will supervise the company's network of sales offices and sales representatives.

► The Silicone Products Department of the General Electric Co. has opened a sales office in Burlingame, Calif. The expanded sales coverage is designed to improve service to San Francisco customers, formerly serviced from Los Angeles. Red Baurmeister has been named representative for the company in the new office.

► Louis Urbach, formerly a producer of plastic products in the New York City area, has formed a new firm, Trophy Industries, Inc., Los Angeles, Calif., which will specialize in plastic and vinyl products for industry, farm, government, and commercial use. Equipped with large electronic heat sealing machines, the new firm will produce large made-to-order plastic and vinyl products, such as one-piece, over-sized covers for industrial and farm machinery, plastic irrigation and drainage canals, inflatable dome houses, mammoth tarpaulins for atomic subs, pool covers and pool liners. The firm's regular commercial product lines will include all types of heat sealed plastic and vinyl quilting, as well as a large above-ground plastic swimming pool, a new line of air mattresses, inflatable pool toys, floating games, and other pool accessories. These will be produced for private labels as well as under the Trophy brand name.

► W. B. Sander, formerly manager of the Fresno, Calif., plant of the Dobeckmun Co., has been appointed to the newly-created position of West Coast production manager at Berkeley plant and for the polyethylene extruding operations in Fresno and at Hawaiian Extruders, Inc., Hawaii.

► Breaking ground for the new, modern warehouse facility for the Cabot Corp. at Vernon, Calif., is Donald Simonds (center), Cabot's west coast regional sales manager. Pictured with him are Raoul Dedeaux (left), from whom the warehouse is being leased, and Charles Ashcroft, Cabot's assistant western regional sales manager. The building, designed to provide improved customer services in southern California, is expected to be completed in August, 1961. Cabot will also continue to maintain warehouse facilities at San Francisco.

Akron Rubber Group Holds Summer Outing

► The Akron Rubber Group held its Annual Summer Outing on June 16, 1961, at the Firestone Country Club, Akron, Ohio, with 950 members and guests present. A golf tournament was held on June 15 as well as June 16 because of the large number of entries. The outing program also included a decathlon contest, which was won by Bob Wharton (Goodrich Chemical). Daniel J. Chovan (Witco) was general chairman of the outing. Other committeemen were: *Golf*, Gene Becker (General Tire), Chairman; D. Auten (Firestone); T. Betchel (DuPont); V. Buehrle (Columbian Carbon); D. Erickson (General Tire); C. Lauer (Harwick Standard); V. Giulitto (Goodyear); W. Hall (Phillips); H. Pence (St. Joseph Lead); B. Pettus (Goodyear); M. Ruth (J. M. Huber); J. Smith (Goodrich-Gulf); J. Strong (Goodrich); D. Wilson (Sid Richardson).

On right, Irvin J. Sjothun (Firestone), chairman of the Akron Rubber Group, presents to Bob Wharton (Goodrich Chemical), left, a trophy for winning the decathlon contest. D. Chovan (Witco), general outing chairman, looks on.

Decathlon Chairman, Maynard Bobbitt (Firestone); *Food and Location Chairman*, L. V. Cooper (Firestone); *Prize Committee*, J. A. McDonough (DuPont), chairman; D. Conley (General Tire); G. Esakov (Goodrich); J. Sawyer (Goodyear); K. J. Kennedy (Goodrich); L. Wooddel (DuPont).

► A latex accelerator study, "Thirams and Dithiocarbamates in Hevea Latex", has been published by the Industrial Chemicals Division of Pennsalt Chemicals Corp., Philadelphia, Penna. Ask for bulletin S-170.

Wins RUBBER AGE Award

► Edward Herlicska, son of a Hungarian sculptor, and an emigrant to the United States in 1951, has been awarded the Fourth Annual RUBBER AGE Award, an honorarium of $100, for the best work done in rubber technology courses at the University of Southern California during the 1960-1961 academic year. Mr. Herlicska, a research engineer at the Richfield Research Center, Anaheim, Calif., attended courses at the School of Engineering, sponsored by the Rubber Technology Foundation of the Los Angeles Rubber Group (TLARGI).

Edward Herlicska

Mr. Herlicska attended grade school and high school in Nagykanizsa, Hungary, but in 1944, during the war turmoil, moved with his family to Germany. After the war, upon trying various occupations—locksmithing, cabinetmaking, and drafting — he undertook a more serious study of sculptoring from 1946 to 1951. After settling in the United States in 1951, he was employed as an artist in a church furniture manufacturing company. In 1952, Mr. Herlicska was drafted into the Marine Corps for two years. Following his honorable discharge as a sergeant from the military service, he attended Los Angeles City College for three years and obtained a B.A. degree in general engineering in 1957.

For the past four years, Mr. Herlicska has attended the University of Southern California, obtaining his B.S. degree in chemical engineering in 1960, and his M.S. degree in chemical engineering in 1961. Besides being the winner of the RUBBER AGE Award, he is the holder of the Richfield Graduate Fellowship and, during the 1961 semester, was Research Assistant on the DuPont Research Contract. He is a member of the A.I.Ch.E. student, local and national chapter.

The RUBBER AGE Award at the University of Southern California is similar to its Award at the University of Akron.

Thiokol Develops Cure

► A new cure system, said to produce resilient, spongy polysulfide rubber that may be colored from white to black, has been developed by the Thiokol Chemical Corp., Trenton, N. J. The curing agent, sodium carbonate peroxide, was developed by W. E. Leuchten and A. F. Fondy. A typical two-package formulation includes in one part an epoxy resin and a paste of the peroxide cure agent and pigment in a compatible solvent vehicle. The other part contains a Thiokol liquid polysulfide such as LP-32, reinforcing fillers, and a compatible plasticizer. According to Thiokol, white spongy rubber can easily be obtained with this new cure system.

Installs Control System

► An automatic control system for tire production is being installed at the Eau Claire, Wisc., plant of the U.S. Rubber Co. by Electro Nuclear Systems Corp., Minneapolis, Minn. The complete system will include monorail conveyors to deliver tire carcasses and load them into molding machines. Tire-carrying "trolleys" will incorporate coded address, read by magnetic equipment which direct their loads to the proper molding position. The new system in the Eau Claire plant is designed to eliminate manual handling of heavy truck and tractor tires which formerly were loaded and unloaded by hand and were transported on hand trucks to the processing position.

Canadian News

► The Canadian Government is reported to be considering the advisability of selling the government-owned Polymer Corp. Ltd., Sarnia, Ontario, to private interests. The question as to whether the company may have outgrown government ownership arose when Polymer president E. Ralph Rowzee asked for approval of a $30 million expansion program in Europe. This is more than the company can finance out of retained earnings (usually $6 to $7 million a year), and so it must apply to the government or the money market for additional funds. The European expansion program, which has meanwhile been approved by the Cabinet, is said to be Polymer's answer to the growing surge in foreign synthetic rubber production, which may eventually take over the Canadian firm's export markets. Polymer currently produces 10 per cent of the non-Communist world's synthetic rubber; about 60 to 70 per cent of this output is exported.

The company has already started to get in on the overseas plant building boom with a $12 million specialty rubbers plant (high-styrene and nitrile types) which it is now constructing in France. A $15 to $20 million butyl rubber plant is scheduled for Great Britain, but may go elsewhere.

Control in Canada

If the Cabinet should decide to sell Polymer to privately-owned firms, however, it will probably have to reassure Parliament that control of the company will remain in Canada. The most logical purchasers are subsidiaries of foreign companies. Ventures Ltd., a mining investment group which, thus far, has made the only firm offer, was rejected last year on a bid of $75 million. Other eligible firms are Dow Chemical of Canada, Goodyear, Goodrich, Firestone (the Canadian subsidiaries), and Dominion Rubber, Imperial Oil (subsidiary of Jersey Standard) and Shawinigan.

But whether they remain under government control or not, Polymer officials apparently are concentrating on growth opportunities. Other projects now under way include construction of a 20,000-ton per year polybutadiene plant and a black masterbatch line, both at Sarnia.

► Dominion Rubber Co. Ltd., Montreal, Canada, has announced three new executive and sales appointments. W. C. Botkin, treasurer since 1946, has been made a vice-president of the firm. J. R. Falconer, formerly manager of the Footwear Division, has been appointed general manager of the division, while W. H. Schmalz, formerly manager of the General Products Division in Kitchener, Ont., has been named general manager of that division. The appointments of Messrs. Falconer and Schmalz follow the retirement of H. Wolfhard, vice-president and general manager of the Footwear and General Products Division. Mr. Wolfhard retired from the firm after 49 years of service.

Mr. Botkin, a native of Winchester, Ky., and educated there and at Los Angeles, Calif., will continue as treasurer of Dominion Rubber. Mr. Falconer, who joined Dominion Rubber in 1930, had formerly been footwear sales representative in the Saint John branch, later becoming assistant to the general sales manager. He will make his headquarters in Montreal. Mr. Schmalz joined the company in 1940 as an industrial engineer, after graduation from the University of Toronto with a B.S. degree. He later directed new product development before being appointed manager of the General Products Division. He will be located in Kitchener, Ont.

► Seiberling Rubber Co. of Canada Ltd. has appointed B. K. Ziemann as sales manager and has named S. J. Eydt as manager of dealer development. A graduate of McMaster University, Mr. Ziemann joined the company in 1959. He has had extensive experience in rubber industry sales and sales promotion. Mr. Eydt, prior to his new appointment, was manager of Seiberling truck tire sales in Ontario. He has had more than 13 years' experience in the tire industry.

► A $300,000 contract has been awarded to Dunlop Canada, Ltd., for the installation of rubber linings in a new titanium dioxide plant. The unit will be built for British Titan Products Canada, Ltd., at Tracy, Quebec.

► Goodyear Tire & Rubber Co. and Firestone Tire & Rubber Co. have granted wage increases at their Canadian plants in bargaining with the United Rubber Workers. Under a one-year agreement, Goodyear has granted 1,200 employees at its New Toronto plant a pay increase of 6c an hour for day workers, and an additional 5c for piece workers. Firestone employees in Hamilton, Ontario, will receive 4.75c more an hour on piece rates. Day workers and time cycle workers will earn 6c more an hour, boring mill operators, 7c, and others, up to 16c. The wage increases will be added to the basic hourly rate of $1.92.

► Polymer Corp., Sarnia, Ontario, has cut Canadian prices of general purpose SBR by one cent a pound, in a move to help Canadian tire and rubber manufacturers achieve higher profit margins. Prices of some other synthetic types have been cut by smaller amounts. It is understood that no changes in retail prices are anticipated by most of Polymer's customers. A Canadian tire manufacturing official stated that, as the average car tire contains ten pounds of synthetic rubber, the cost saving would be little more than ten cents per unit.

► According to the Dominion Bureau of Statistics in Ottawa, Canadian demand for rubber products in 1960 showed a decline from the previous year, amounting to a 10 per cent reduction in the quantity of new rubber consumed (101,475 long tons in 1959, to 91,035 in 1960). Rubber consumption in 1961 is expected to remain at about the 1960 level. Competition from imports continues to grow; during 1960, the total value of imports of rubber products rose 3 per cent to a record value of $43,523,000.

► The Rubber Chemistry Division of the Chemical Institute of Canada has elected its officers for 1961-1962. The new slate follows: *Chairman,* D. H. Hay (Polymer Corp.); *Vice-Chairman,* C. M. Croakman (Columbian Carbon, Canada); *Secretary - Treasurer,* W. Cline (Canadian General-Tower); *Directors:* W. J. Nichol (Dunlop Canada); A. Holden (Canada Colors & Chemicals); and L. Robinson (Canada Wire & Cable).

C. D. McCleary

Named Research Director

► Dr. Charles D. McCleary has been appointed director of research and development for the Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn. Dr. McCleary succeeds Dr. Wesley S. Coe, who has recently been elected managing director of Petroquimica, S.A. (PASA), a new company recently formed by U. S. Rubber and four other firms to build a petrochemical complex in Argentina. In his new post, Dr. McCleary will head a research and development staff of scientists located in the division's laboratories and pilot plants in Naugatuck, Conn., Baton Rouge, La., Painesville, Ohio, and Bethany, Conn.

Dr. McCleary holds a B.S. degree from Wittenberg University, and received a Ph.D. in chemistry from Ohio State University. He joined Naugatuck Chemical's Research and Development Department as a research chemist in 1940. He became manager of process development for the department in 1950, and two years later was selected to head its basic research group. In 1954, he was appointed manager of Marvinol vinyl resin development, and the succeeding year became assistant director of research and development for the division.

► The footwear plant of the United States Rubber Co., Naugatuck, Conn., has loaned a desk with a hard rubber veneer, an ink well, three gold-headed canes and several other mementos from the personal effects of Charles Goodyear to the Naugatuck Historical Society, for permanent preservation in the community's historical museum.

Patent Extension Opposed

► A bill introduced in the House of Representatives, which would extend the life of a patent by five to ten years, was opposed recently by the Defense Department, Patent Office, Justic Department, and the American Patent Law Association at hearings before a House committee. Sponsored by Representative Roland Libonati (Democrat-Illinois), H.R. 459 would extend the life of a patent beyond the usual 17-year term if the patentee could prove to the satisfaction of the Commissioner of Patents that the problems of raising enough money to put the invention on the market resulted in inadequate remuneration before the patent expired. At the hearing, Fritz Lanham of the National Patent Council charged that the bill is based on the false premise that the Government guarantees financial returns on patents.

Lipco Paste Available

► Lipco Paste, available from the Long Island Plastics Corp., Lindenhurst, N. Y., has been blended into a nylon-rubber compound and injection molded—the first time that nylon-rubber has been successfully processed by this method, according to the company. Long Island Plastics states that the use of the paste in the injection molding process improves quality and accelerates molding and curing cycle time significantly. Perfect pieces have been molded in from 30 seconds to 2½ minutes, the firm reports, compared with cycle times of from 2½ to 4 minutes for compounds without the additive. Lipco Paste is a patented rubber additive miscible with both synthetic and natural rubber.

Crosby Joins Little

► Josiah D. Crosby has joined the senior professional staff of Arthur D. Little, Inc., Cambridge, Mass. He will be concerned with development work in elastomers and rubber technology. Mr. Crosby is a graduate of the Massachusetts Institute of Technology. He was formerly associated with the Hood Rubber Co., now the B. F. Goodrich Footwear and Flooring Co., where he specialized in rubber and vinyl technology and manufacturing technique, as well as thermosetting, plastic molding, and laminating.

G. W. Sadler

Joins Rubber Bureau

► George W. Sadler has been appointed technical representative for the Technical Service Division of the Natural Rubber Bureau, Washington, D. C. He recently returned from orientation meetings at the Natural Rubber industry laboratories at Welwyn Garden City, just outside London, England, and will call on rubber manufacturers from the Bureau's new branch office in New England. Mr. Sadler, a graduate of Franklin Technical Institute, has had nearly 14 years of experience in rubber goods compounding and production. He has served as a technical service representative for the Columbia-Southern Chemical Co., and as a compounder and production supervisor at Tyer Rubber Co. and at Avon Sole Co. Most recently he has been associated with the Beebe Rubber Co. as laboratory manager.

Offers Hydrophobic Clays

► Georgia Kaolin Co., Elizabeth, N. J., has developed two new RER resin-treated clays called RER-7 and RER-45. The new clays are hydrated aluminum silicate pigments which have been surface treated to provide the maximum hydrophobic characteristics. The company states that the materials are so hydrophic that they cannot be wet with water. In addition, they have excellent compatibility in organic systems of low and medium polarity. Suggested applications are in rubber systems, as well as in paint, plastic, and other organic systems where excellent compatibility, low water absorption and inert characteristics are required.

Obituaries

C. B. Copeman

► C. B. Copeman, former chairman of Maclaren and Sons, Ltd., London, England, publishers of *Rubber and Plastics Weekly*, died on July 21 at his home in Bexhill-on-Sea.

He was 74 years old. Mr. Copeman became a director of Maclaren in 1919, was named vice-chairman in 1927, and became chairman in 1951. He was a member of the Institution of the Rubber Industry, joining that group in 1921, the year it was founded. He had served on the Council of the IRI since 1921, except for the years of rotational retirement. He also served on the Executive and Finance Committees of the IRI. From 1957 to 1959 he served as vice-president of the IRI. In 1960, Mr. Copeman was awarded the Hancock Medal for outstanding services to the IRI and the rubber industry.

Barnett Buddish

► Barnett Buddish, retired vice-president and member of the board of directors of the Rubberset Co., Orange, N. J., died on July 19 at the age of 69. Mr. Buddish came to this country from his native England at the age of sixteen. He started in the brush industry the next year. While working, he also attended high school and college and in 1917 received his law degree from the New York Law School. He served as vice-president and board member of Rubberset from 1941 until his retirement last year. Mr. Buddish leaves his widow, a daughter, a sister, and a brother.

George J. Klein

► George John Klein, manager of rubber chemical sales in the Akron, Ohio office of the Industrial Chemicals Division of the Pennsalt Chemicals Corp., Philadelphia, Penna., died on June 12 of a heart attack. He was 58 years old. Mr. Klein graduated from Purdue University in 1924 with a B.S. degree in chemical engineering. He joined the B. F. Goodrich Co. that year as assistant to the manager of tire compounding, and later became manager of inter-company relations. He was manager of raw materials inspection and development when he left Goodrich in 1936 to become vice-president and technical sales manager for Herron Bros. & Meyer. He had been manager of rubber chemical sales in charge of the Akron sales office for Pennsalt since 1949. Mr. Klein was a member of the American Chemical Society, as well as of the ACS Rubber division, the Akron Rubber Group, Southern Ohio Rubber Group and Southern Rubber Group. He leaves his widow, a son and two grandchildren.

William S. Wolfe

► William S. Wolfe, former director of domestic production for the Goodyear Tire & Rubber Co., Akron, Ohio, died June 30 at Delray Beach, Fla. He was 70 years old. Mr. Wolfe graduated from Marietta College in 1910 with a B.A. degree, and received a chemical engineering degree from Massachusetts Institute of Technology in 1912. He joined Goodyear that year as a member of the Development Department, and became chief development engineer three years later. He left Goodyear in 1922 to become vice-president and factory manager of the Seiberling Rubber Co. When he rejoined Goodyear in 1934, he was assigned to sales work, principally on truck tires. He rejoined the factory organization as manager of development in 1937, became factory manager in 1939, and was promoted to director of domestic production in 1957. He retired in 1959. Mr. Wolfe leaves his widow and a son.

John W. Bicknell

► John Warren Bicknell, retired managing director of the Plantation Division of the United States Rubber Co., New York, N.Y., died on June 21 at his home after a long illness. He was 74 years old. Mr. Bicknell graduated from Harvard in 1909. Three years later he opened the Singapore office of the General Rubber Co., a subsidiary of United States Rubber. In 1913 he opened the Medan, Sumatra, office of United States Rubber Plantations, Inc., which in 1934 became a general division of United States Rubber. He served as managing director of this division until 1949, when he became a consultant. During World War II, Mr. Bicknell was executive vice-president of the Rubber Development Corp., the Government agency for procuring natural rubber from foreign countries when the Far East supplies were cut off. Mr. Bicknell leaves a son and a grandson.

Ralph Waldo Atkinson

► Ralph W. Atkinson, electrical engineer and inventor of many cable devices, died on May 19 at his home in Westfield, N. J. He was 73 years old. Mr. Atkinson graduated from Iowa State College in 1906, and received an electrical engineering degree there in 1911. After his graduation, he put in a two-year apprenticeship with Westinghouse Electric & Mfg. Co. From 1908 to 1923, he served as assistant to the chief engineer of Standard Underground Cable Co., and from 1923 to 1929 was chief electrical engineer. After the company was absorbed into the General Cable Corp., Mr. Atkinson continued as director of high voltage research. From 1944 to 1952 he was chief research engineer, and for the next two years was director of research. After his retirement in 1954, he served the company as a consultant. Mr. Atkinson leaves his widow, a son, and a daughter.

Alva D. Stewart

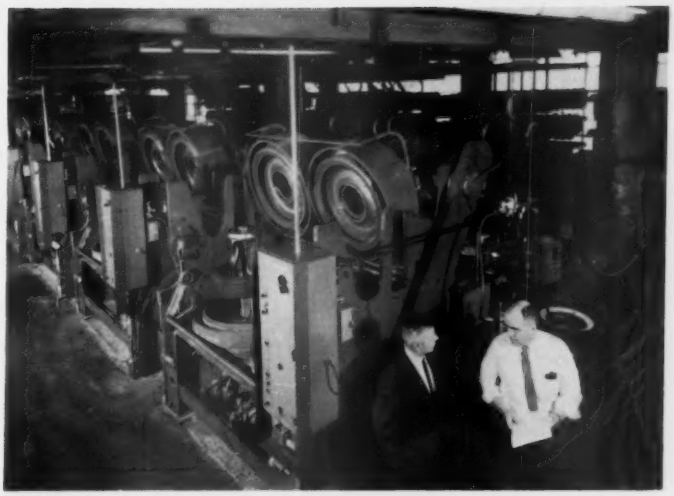
► Alva D. Stewart, assistant treasurer of the General Cable Corp., Perth Amboy, N. J., died on June 27, at his home, at the age of 53. Mr. Stewart was a graduate of Bowdoin College, and received a master's degree at the Harvard Graduate School of Business Administration. Surviving are his widow, a daughter, and a son.

Goodrich Aerospace Unit

► B. F. Goodrich Co., Akron, Ohio, has established a new division, called the B. F. Goodrich Aerospace and Defense Products Division, to handle its business with the Federal Government. According to J. W. Keener, Goodrich president, the new division replaces B. F. Goodrich Aviation Products Division, and has been assigned company-wide responsibility for direct contract sales to the U. S. Defense Department and other Federal agencies.

The name change, Mr. Keener said, is being made to reflect more clearly the division's activities in the general defense area and in the space and missile fields. Sales to the Government of tires, footwear, life jackets, exposure clothing, hose, and other rubber, plastics, and sponge products formerly handled by other company divisions, will now be the responsibility of Aerospace and Defense Products. Goodrich's direct and indirect sales to the Federal Government in 1960 amounted to $55,825,740, 7.3 per cent of its total net sales.

Mr. Keener also announced that C. B. McKeown, general manager of the former B. F. Goodrich Aviation Products Division, has been appointed general manager of the new Aerospace and Defense Products Division.



Automation in Tire Curing

► Automation reaches another production process—the method of curing tires—with the installation of new automatic curing presses at the Akron, Ohio, tire plant of the Seiberling Rubber Co. The company reports that the automatic presses have increased production by as much as 50 per cent.

The tires cured under the doughnut-shaped domes are ejected out the back onto a conveyor (right, rear) for delivery to the finishing and shipping department. Production vice-president E. A. Hensal (left) and chief staff engineer J. T. Pope supervised the $270,000 installation.

Argentine Group Active

► Since its formation in November, 1959, by a number of Argentine rubber technologists, the Instituto Argentino de Elastomeros has been conducting a regular program of activities, including a series of technical lectures and conferences. Among the speakers who have appeared before the group is Dr. Norman Bekkedahl, Chief, Polymer Structures Section, U. S. National Bureau of Standards. The program for 1961 features regular technical sessions, as well as several special lectures to be given by experts in different fields who are concerned with rubber. The Argentine rubber group was formed with the purpose of contributing to the development of the science and technology of rubber in Argentina. The group currently has 109 members. Santos Zeuli is president and Dr. Emilio Victor Pineda is secretary of the Institute which maintains headquarters at Chile 1192, Buenos Aires, Argentina.

Nopco Exchanges Stock

► Nopco Chemical Corp., Newark, N. J., previously a majority stockholder in the Brown Rubber Co., Lafayette, Ind., has exchanged a large number of its Brown Rubber shares for shares of the Mundet Cork Corp., New York, N. Y., previously held by four individuals. The exchange of stock gives Nopco a substantial minority interest in Mundet, and a minority interest in Brown Rubber. According to G. G. Stier, Nopco vice-president, the new Brown Rubber stockholders, who now have a majority interest in the company, plan to resume manufacturing operations, which have been suspended for some time.

Nopco reports that, in lieu of notes it has held, it had acquired from Brown Rubber title to a 90,000 square foot building and approximately 18 acres of land in Lafayette. The company plans to install urethane foam production facilities on the property to service its Midwest marketing area.

Helene Curtis Merger Off

► Helene Curtis Industries, Inc., Chicago, Ill., has abandoned negotiations for the purchase of the Pyramid Rubber Co., Ravenna, Ohio. The proposed purchase was to have been made through the issuance of an undisclosed number of Helene Curtis shares. A statement issued by Pyramid Rubber revealed that the talks were broken off because the merger would have required the owners of Pyramid to relinquish control of the firm.

Increases Styrene Output

► Shell Chemical Co. has completed an expansion of its styrene production facilities at Torrance, Calif., which boosts plant capacity to 210 million pounds a year. The expansion represents an increase of 85 million pounds from its rated capacity in 1955, the year Shell acquired the Torrance styrene facilities and synthetic rubber complex from the U. S. Government.

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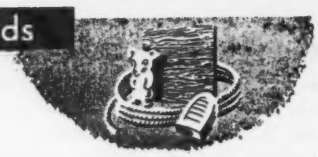

Aqua-King Life Belt

► Water Sports Belts, new life belts designed to provide safety and comfort for water skiers, are being produced by Aqua-King Manufacturing Co., Fort Worth, Texas. The belts are made from soft Geon vinyl foam and a vinyl coating containing Geon. The foamed unicellular vinyl is said to provide 15 per cent more buoyancy than cork with less weight. If surfaces should be cut, only the cells exposed lose their buoyance. The vinyl coating affords a tough, resilient cover, offering the wearer maximum comfort. Geon, a product of the B. F. Goodrich Chemical Co., Cleveland, Ohio, was chosen for the life belts, according to the company, because it is light, tough, won't rot or mildew, and can't be harmed by sun, salt water, or most chemicals.

Kwik-Bed Foam Rubber Sofa

► A sofa designed for both sitting and sleeping has been developed by the Kwik-Bed Sofa Corp., Indianapolis, Ind., utilizing pin core latex foam rubber manufactured by the Firestone Rubber & Latex Products Co., Fall River, Mass. Called the Chameleon, the sofa is styled for living room decor, but can be converted into a completely made-up bed in a matter of seconds, according to the manufacturer. The latex foam rubber makes possible the sofa's slim-line, off-the-floor construction.

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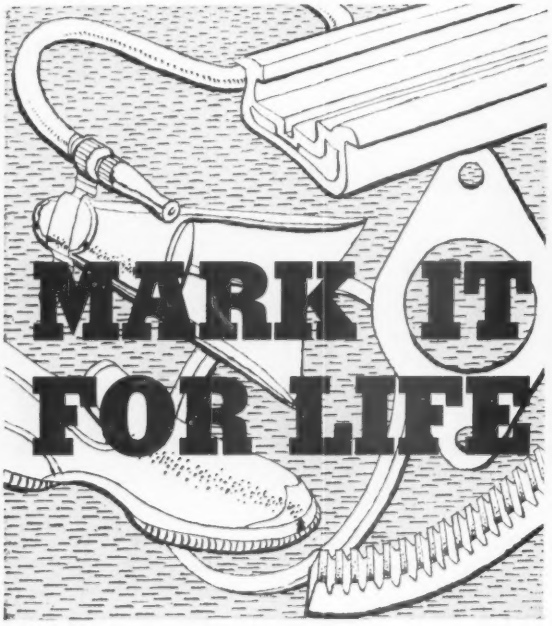

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Safety-Surf Playground Mat

► Mitchell Rubber Products, Inc., Los Angeles, Calif., has designed a playground cushion called Safety-Surf which reportedly prevents serious injuries and sharply reduces minor accidents to children in playgrounds. Safety-Surf is a deep-

ribbed mat made of butyl rubber, said to provide enough resiliency to absorb the impact of a falling body without "bottoming". In addition, the material is durable, non-toxic, and easy-to- maintain. The 3/16′ playing surface of the mat is supported by one-inch deep ribs, similar to a waffle grid. Within each rib cell there are four smaller rib structures, allowing adequate decelleration and wide-area distribution of impact. The extra level of ribbing prevents the impact from carrying through to the hard surface on which the mat is set. To permit easy installation or relocation, the Safety-Surf is manufactured in relatively small interlocking components and can be assembled in almost any dimension required. The beveled border on the perimeter, designed to prevent tripping or stumbling, is an added safety feature.

General Tire Rubber Sack

► A six-foot, reusable rubber sack for use with ready-to-mix concrete has been developed by the General Tire & Rubber Co., Akron, Ohio. The reusable sack is designed to permit cement makers, concrete mixers and contractors to prepare batches in advance, the company says. All the ingredients—sand, gravel, cement, and even water—are stored independently in the sack until mixing time.

Karpen Chair-Foam

► A new-type chair consisting of a rigid tubular steel frame surrounded by polyurethane foam cushioning material has been introduced by the Karpen Furniture Co., 4820 W. Belmont Ave., Chicago 41, Ill. The chairs in the line, called the Karpen Chair-Foam Collection, are fabricated by means of a new manufacturing technique developed for the company by General Tire & Rubber Co., producers of Polyfoam polyurethane. The patented technique permits fabrication by molding all-foam chairs on a mass production basis. The company states that once the steel frame is positioned in the mold, the time required for the added liquid chemicals to "blow" and form the entire chair takes only a few seconds. Chief advantages claimed for the new technique are that it allows freedom of form in design (the frame within the chair is completely hidden) and provides unusual comfort. The chair is said to be mildew resistant, allergy-free, durable and lightweight. In addition, the use of polyurethane will increase the life of the upholstery fabric, according to the company, because the fabric rests on a soft, resilient foundation which minimizes abrasion at points of greatest wear.

Wilson Industrial Gloves

► Wil-Gard Neoprene Industrial Gloves, manufactured by the Wilson Rubber Co., 1200 Garfield Ave., S.W., Canton 6, Ohio, are said to assure dependable hand protection for industrial services requiring contact with oils, greases, petroleum solvents, caustics, and other toxic solutions. Reported to be free of allergens that often irritate sensitive skin, 88-Smooth and 88-Firmhold finish industrial gloves will not deteriorate from age or exposure to sunlight, the company states. The gloves offer curved-finger styling for comfort and flexibility, and are available in 11-inch lengths, in medium-heavy weight, in sizes from 7 to 11.

Safe-T-Line Rubber Tubing

► Safe-T-Line, a Teflon-lined rubber tubing designed to ensure safe flow of highly corrosive laboratory and industrial fluids at temperatures as high as 300°F., is available from W. S. Shamban & Co., 11617 West Jefferson Blvd., Culver City, Calif. The tubing has a Teflon liner inside a rubber neoprene jacket, making it exceptionally tough and flexible, according to the company, and keeping it from collapsing under severe conditions. Tubing sizes range from ⅛" i. d. diameter to ½" i. d. diameter, with working pressures of 125 psi. Safe-T-Line is also available in special, rubber jackets.

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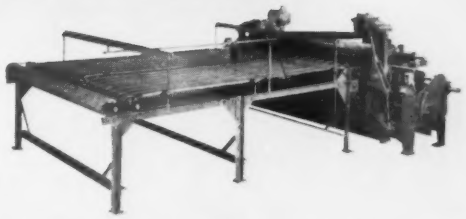

• A high production, self-contained machine, the Alfa Stock Cutter is complete with motors, variable speed control, synchronizer and conveyors. Measures and cuts to length a continuous material flow from processing machines or yardage rolls.

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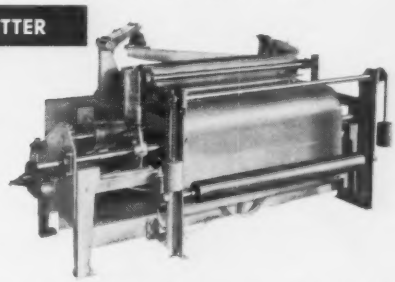

• For automatic cutting of yardage rolls or may be synchronized to a continuous processing line. Accurately cuts wide range of materials — battings, plastics, textiles, paper, rubber stock and sponge. Fully self-contained, the machine is complete with motor and synchronizer and meets a wide range of cutting problems.

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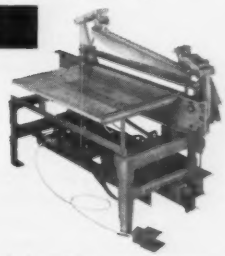

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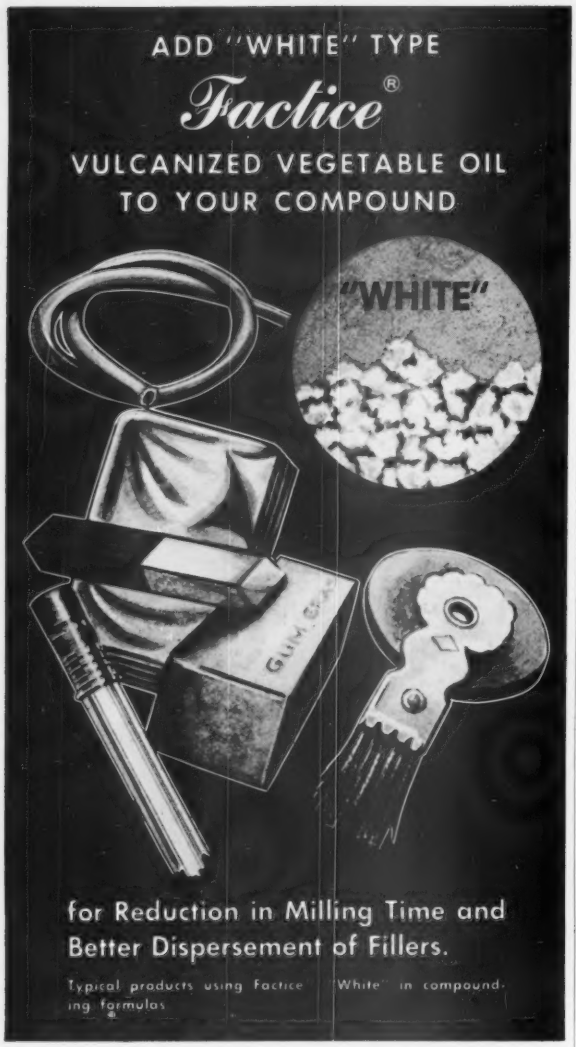

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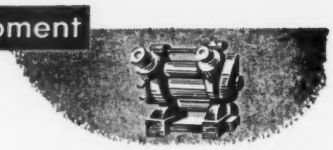


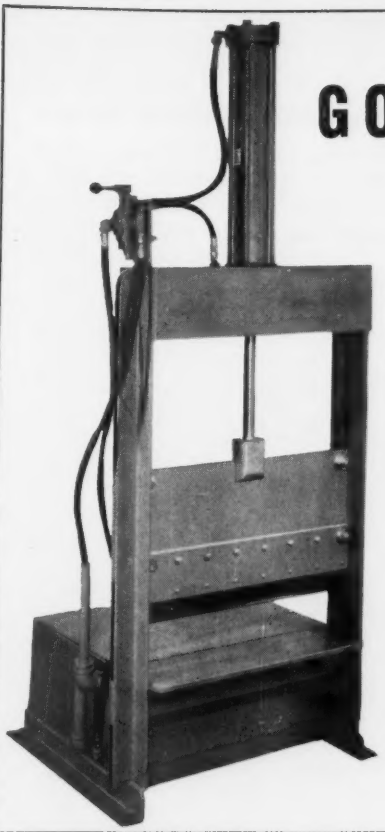
Richardson Bagging Scale

► Richardson Scale Co., Clifton, N. J., has developed a polyethylene cube net weighing bagging scale said to be free from the danger of product contamination and to minimize the possibility of metal or other foreign matter dropping into the

material while it is being weighed. The scale, designated E-52, has no dust-collecting ledges or shelves to come into contact with material. In addition, there are no operating levers or linkage to impede the path of the material from overhead supply down into the bag, providing, the manufacturer states, smooth-surface feeding and weighing compartments and consequent free-flowing throughout the weighing cycle. The E-52 will weigh and fill ten 100-pound bags per minute, with an accuracy of 2 Sigma 1 ounce. The scale is normally used for weighing 25, 50, and 100-pound bags, but other sizes are available.

Merit Grinding Wheel

► A miniature, flexible grinding wheel, called Grind-O-Flex, has been introduced by Merit Products, Inc., 3691 Lenawee Avenue, Los Angeles 16, Calif. The small wheel is available in 2½ or 3 inch diameter and can be used on fixed or portable shafts at speeds up to 15,000 rpm. Constructed of scores of thin, flexible abrasive strips, the Grind-O-Flex comes in a variety of grits for plastic, metal, or wood usage. According to the manufacturer, the design of the wheel is such that fresh abrasive is constantly exposed as the wheel is used.



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It is interesting to note that although the electron microscope was developed barely 30 years ago, it has been applied to the study of rubber structure since 1940. The value of microscopy, however, depends as much on the experience of the microscopist in interpreting what he sees as on his ability to prepare his specimens well and to operate his microscopes efficiently. This book will help the microscopist by showing him where and how to look for the needed experience. It also indicates to others how an experienced microscopist will be able to help them. The term "rubber" as used in the book takes in elastomers in general and not natural rubber alone.

CONTENTS

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II. Techniques
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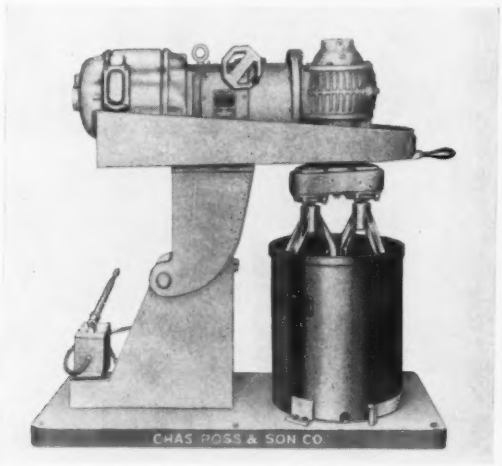
► A new double planetary changeable can mixer with dispersion type stirrers and simplified hydraulic lowering and raising device is available from Charles Ross & Son Co., Inc., 148 Classon Ave., Brooklyn 5, N. Y. Available in 8, 12, and 20 gallon sizes, the new mixers are part of a line of



double planetary mixers which come in one quart to 150 gallon sizes. The machines feature a built-in hydraulic control for raising and lowering stirrers from the can. The stirrers tilt back out of the can for cleaning or removal, so that the floor-mounted mixers are compact and low in overall height. Stirrers are of one-piece cast steel or stainless steel, and overlap the center of the can as well as each other. According to the manufacturer, the close rubbing action of the stirrers develops a tremendous compressive and shearing action on the heaviest paste materials, producing results previously obtainable only in double arm kneading machines. Standard units are provided with variable speed motor drive; vacuum covers or jacketed cans are among the optional features.

Model L Ozone Recorder

► Ozone Research & Equipment Corp., 3840 N. 40th Avenue, Phoenix, Ariz., has developed the Model L ozone recorder said to be designed for ten days of unattended operation while continuously recording, on a strip chart, ozone concentrations from zero to 1000 pphm/volume. According to the manufacturer, the strip chart recorder can either be located on the recorder itself, or be panel-mounted on a remote instrument panel. The Model L operates on a 115 volt, 60 cycle ac source. Its measurements are 56½ x 28⅜ x 24 inches, and its weight is approximately 275 pounds.

West Pressure Indicators

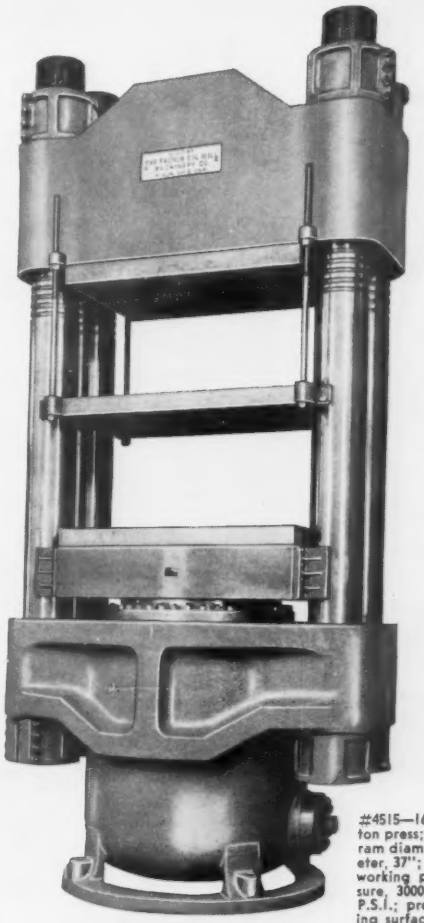
► Two pressure instruments for plastic extruders are being offered by West Instrument Corp., 4363 West Montrose Ave., Chicago 41, Ill. One is a pressure indicator, the other an indicator and high-pressure alarm. The transducers offered with these pressure instruments are of the flush diaphragm type. According to the manufacturer, this type of pressure detector will not pollute the plastic melt with grease, or hold plastic so as to discolor new runs if the color is changed. "Push button calibration" is said to eliminate deadweight testers or comparison gauges, and is useful both on the original installation and in adjusting for transducer "drift" caused by temperature. Either water- or air-cooled transducers may be used. Both fit the standard melt thermocouple opening now used in many extruders. Either instrument may be used for head pressure indication, according to the manufacturer, and the high pressure alarm unit can be set at a pre-determined pressure to give an alarm when this pressure is exceeded, thus warning of clogged screens.

Thermodot Thermometer

► Model TD-6 Thermodot radiation thermometer, developed by the Radiation Electronics Co., 5600 Jarvis Avenue, Chicago 48, Ill., automatically measures and controls temperature without contact. According to the manufacturer, it can be used in assembly line production, industrial testing and quality control, as well as an integral part of process control and automation systems. Typical applications of the Model TD-6 include: process control and non-destructive testing of rubber products, ceramics, and plastic sheet; measurement and control of temperature in industrial heating; and inspection and quality control in metal fabricating. Utilizing advanced methods of infrared detection, the Thermodot is said to provide accurate temperature measurements from 210° to 3300°F., and it can be compensated for ambient temperatures from 50° to 120°F., and to 175°F. with optional water cooling.

Hotpack Vacuum Oven

► A vacuum oven equipped with a foot-operated electric three-way valve, said to simplify vacuum and gas flush operations, is available from the Electric Hotpack Co., Inc., 5076 Cottman Avenue, Philadelphia 35, Penna. Designated Model 733-M, its chamber is capable of evacuating down to 1 micron. The controls include an accurate controlling thermostat, a wattage selector switch, a mercury thermometer, and a vacuum gauge of the oven measures 20 x 24 x 26 inches, and the chamber measures 10 x 14 x 10 inches.



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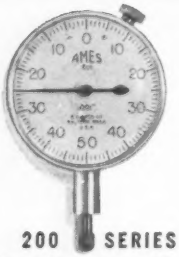

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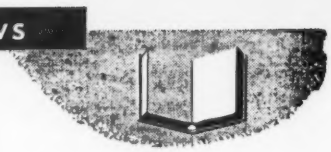

The Applied Science of Rubber. Edited by W. J. S. Naunton. Published in England. Distributed by St. Martin's Press, Inc., 175 Fifth Ave., New York 10, N. Y. 5¾ x 9 in. 1192 pp. $32.50.

(Available from Book Department, RUBBER AGE)

The rubber manufacturing industry has long awaited publication of this book. It is a comprehensive text book of rubber technology written by twenty-five eminent contributors, all of whom have had extensive experience. The editor, Dr. Naunton, long associated with the rubber and plastics operations of Imperial Chemical Industries, Ltd., until his recent retirement, is most qualified to have undertaken the assignment which, incidentally, met with the approval and enthusiastic support of the Papers and Publications Committee of the Institution of the Rubber Industry. In the opinion of this reviewer, "The Applied Science of Rubber" is the most important book on rubber technology to be published since Davis and Blake's "Chemistry and Technology of Rubber." The latter, unfortunately, is now completely out of print.

What is so important about this new work? In simple terms, it meets the need of the world-wide rubber manufacturing industry for an advanced text book on rubber technology which combines both theory and practice. There are many excellent books available to the rubber technologist—new and old—but most of them are devoted to the theories of rubber technology rather than to the compounding and processing which result in the end products which take so many forms and shapes and which are used in every known industry. In no other book printed in English is so much practical information furnished.

As Dr. Naunton is well aware, it is extremely difficult to put together practical data on the compounding and processing of rubber primarily because of the necessity of protecting methods used by various rubber manufacturers. Since in compiling a book of that nature under review it is essential that the contributors should have more than an academic knowledge of their subjects, the question naturally arose whether the rubber industry would allow their experts to contribute frankly and without restraint to such a publication. It is, therefore, gratifying that the foreword to the book clearly states that "in no case was an invited contributor refused permission (by his management)." Since the list of contributors includes authorities from such companies as Dunlop, Goodyear, Firestone, P. B. Cow and Associated Electrical Industries, the statement is far from an idle one.

The list of contributors reads like a Who's Who in the British Rubber Industry. It includes: A. F. Blanchard, G. F. Bloomfield, J. M. Buist, E. G. Cockbain, F. H. Cotton, H. A. Daynes, J. W. Denson, A. C. Edwards, G. N. S. Farrand, J. Glazer, W. A. Gurney, M. M. Heywood, A. J. Hirst, C. H. Leigh-Dugmore, E. W. Madge, G. Martin, L. R. Mernagh, W. J. S. Naunton, F. C. J. Poulton, J. R. Scott, J. F. Smith, W. E. Stafford, R. N. Thomson, J. T. Watts, and R. A. Wright.

There are thirteen separate chapters in the book, every one of which, except one, is divided into two parts, the first part generally covering the theories and the second devoted to practical aspects. As indicated by its size—1192 pages—and the number of contributors—25—as well as by its title, the book runs the full gamut of rubber technology, with special chapters devoted to natural rubber, synthetic rubber, reclaimed rubber and

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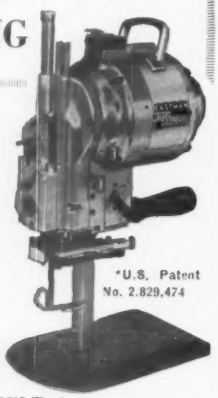

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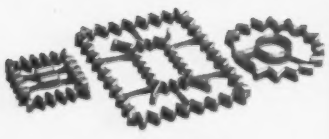

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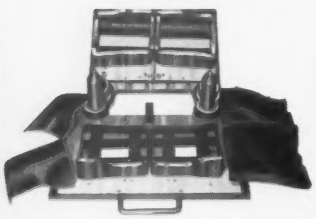

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both natural and synthetic latices. Specific subjects covered include processing, compounding, reinforcement, elasticity and dynamic properties, physical testing, testing of finished products, hard rubber, vulcanization and aging.

In order to keep the book within reasonable limits (and to one volume), Dr. Naunton was compelled to cut down some of the manuscripts, but great care was taken not to delete essential information. On the other hand, as pointed out in the foreword, in such a book, where individual chapters will be studied for specific purposes, it was impossible to completely eliminate repetition, but a determined effort was made to reduce such repetition to a minimum.

Over 300 illustrations, line and halftone, add to the value of the book. In addition, it includes bibliographies containing over 2,000 references. Author and subject indexes have been carefully compiled. Printing and paper are excellent. If any criticism can be applied it is that even more attention might have been paid to the practical aspects of rubber manufacturing, particularly to specific end products. Some day a comprehensive tome will be issued devoted exclusively to the compounding of and processing for specific rubber goods. Until that day, "The Applied Science of Rubber" will represent the best book available on the subject.

•

Viscoelastic Properties of Polymers. By John D. Ferry. Published by John Wiley and Sons, Inc., 440 Park Ave., S., New York 16, N. Y. 6¼ x 9¼ in. 482 pp. $15.00.

During the past two decades viscoelasticity of polymers has been the subject of a great deal of chemical and physical research. Reports of this work as published in dozens of journals have pinpointed the progress being made in many specific areas of rubber, plastics and fibers. The search has been for a more complete understanding of the mechanical behavior of these materials in processing and in the end product.

With this volume, the author, Professor of Chemistry and Head of the Department, University of Wisconsin, has synthesized many of these separate studies. In attempting a summary of specific findings, and theory, to date, his premise is that conceptual schemes in the field have now reached a level of maturity where this can be done with a number of benefits accruing.

He has, for instance, been able to suggest areas where further theoretical and experimental advances are required, and to provide working information assembled from numerous sources for measuring and interpreting data. As a basic text, the volume is designed also to introduce to investigators newly exposed to polymer viscosity in industrial laboratories the working concepts of the field. By the use of several examples it also outlines possible techniques through which practical problems in analysis, processing and use of polymers can be attacked.

The author, in initial chapters, has chosen to develop the subject of viscoelasticity by both formulas and (mechanical) models. While the book is highly theoretical, the latter recur throughout, supplying a graphic picture of the particular stress-strain relationship under study. In the author's words, "The experimental problem in any study of viscoelastic behavior is to determine the relations among stress, strain, and time for a particular type of deformation, and a particular loading pattern, i.e., stress history."

For professionals in the field who are involved with such problems, this volume should be something of a handbook. The treatment of type, illustrations, and formulas is in particularly good taste, simplifying the

intricate sub-divisions into which the text material is divided.

Chapters on the nature of viscoelastic behavior, and illustrations of this, are followed by an exploration of the interrelations of viscoelastic functions. Experimental methods for determining these functions are then explored through a series of five chapters; subsequent topics include molecular theory, the effects of temperature; concentrated solutions and plasticized polymers; gels and cross-linked solutions; behavior in bulk deformation; and illustrative applied calculations.

Of the applied calculations discussed, one has to do with estimate of heat production in cyclic deformation, as in automobile tires, and a second on vibration damping by use of polymeric material in a thin covering layer.

BOOKLETS, CATALOGS, etc.

Perfume Catalog. Florasynth Laboratories, Inc., 900 Van Nest Ave., New York 62, N. Y. 8½ x 12 in. 20 pp.

A section of this catalog of perfume oils and perfumers' materials is of special interest to manufacturers of industrial products. This section contains a list of cover-odors which are widely used to mask unpleasant scents in such materials as rubber (foam rubber, dipped goods, natural and reclaimed rubber, and mercaptans), adhesives, bonded fibers, inks, paints, insecticides, fertilizers, waxes, solvents, and varnishes.

Chemigum N600 Plasticizer Study. (Tech Book Facts CG-42.) Chemical Division, Goodyear Tire & Rubber Co., Akron, Ohio. 8½ x 11 in. 16 pp.

This bulletin presents the results of a recently completed plasticizer study involving Chemigum N600. Tabular and graphic data evaluate the effects of 25 commercially available plasticizers on the original and aged physical properties of a Chemigum N600 test formulation loaded with HAF black. A table lists those plasticizers evaluated in the study, showing chemical composition, specific gravity, suppliers and price structure.

•

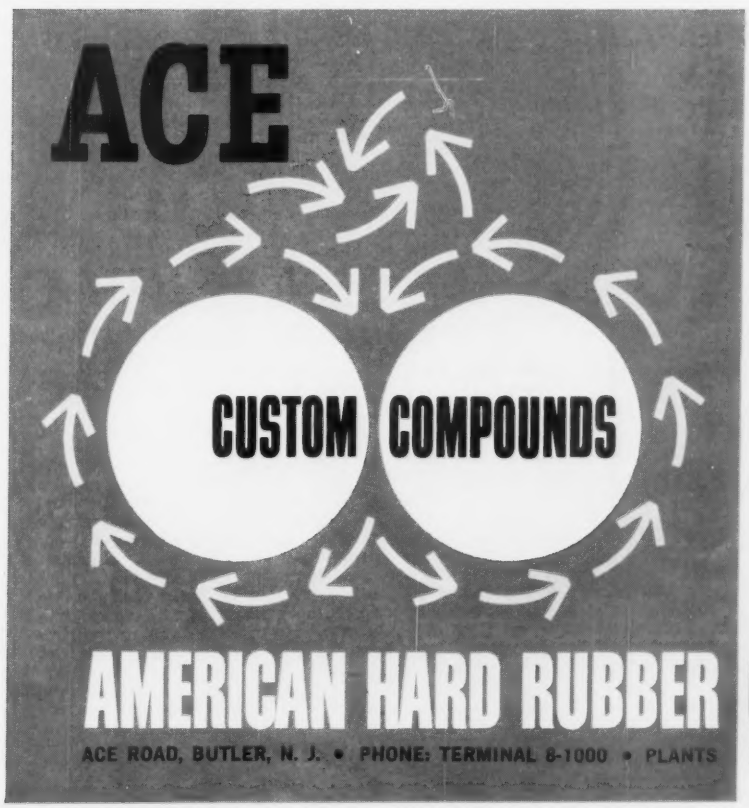
Kralastic for Product Engineering and Design. Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. 8½ x 11 in. 28 pp.

The illustrated booklet describes how acrylonitrile-butadiene-styrene (ABS) plastics can be used in a variety of engineering and design applications. It contains physical and chemical properties for the family of high-impact, moldable ABS plastics made by the division, as well as design information on more than a score of molded products currently being made from this material.

•

Processing Shell Isoprene Rubber. (Technical Bulletin SC:60-168.) Synthetic Rubber Division, Shell Chemical Co., P.O. Box 216, Torrance, Calif. 8½ x 11 in. 4 pp.

Techniques for mixing Shell isoprene rubber compounds are discussed in this bulletin. Step-by-step methods are presented, and suggestions offered for compounding in the Banbury mixer and on the mill. Factors such as Banbury load, ram pressure, peptizer type, and use of a plasticizer are explored.



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MARKET REPORTS

TRENDS NEWS PRICES

Natural Rubber

The price of natural rubber on the New York Commodity Exchange moved in the narrow range of 76 points since our last report (August 4), high for the period being 29.88c reached on July 18 and 20, and low being 29.12c reached on July 25. The average price of spot rubber for the month of July was 29.46c based on 20 trading days. This compares with an average of 30.04c in the previous month.

Analysts at Merrill Lynch, Pierce, Fenner & Smith point out that rubber futures have advanced almost 1c from their recent lows and are approaching the minimum General Service Administration sales price of 30c again. Allowing for the ⅜c quality discount, GSA can once again sell rubber.

This fact may help to counteract any further strength which the international situation may be able to generate. Action in the rubber market and consumer behavior recently points to the fact that rubber may be losing its designation as a "war scare" commodity. Synthetic production capacity far exceeds production, and the synthetic-natural production facilities are being increased rapidly and could possibly be sped up with government urging and support, MLPFS notes.

Price Paramount Factor

Consumers who usually start buying in increasing quantities around this time of year have shown no tendency to rush in and cover. While they are interested in purchases, price is taking precedence over possible outside developments. The feeling is that if supplies of natural rubber become less plentiful, GSA will be available as a seller. It is also felt that sooner or later GSA will drop its minimum sales price. GSA sales of natural during June totaled 708 long tons.

From overseas come unconfirmed reports that the Soviet Union has purchased as many as 20,000 tons of natural rubber. This has added some strength to overseas markets, but good dealer selling in the face of this news halted any attempt at a strong rally. Buying in London was credited to short covering caused by the Russian demand.

India-Malaya Agreement?

A trade delegation from Malaya is expected to go to India in October to see what can be done about a trade agreement between the two countries covering rubber. Malaya may be willing to take Indian currency for any sales. Presently, India uses 65,000 tons of rubber a year of which 24,500 tons are locally produced and 25,000 tons imported from Malaya.

Pan Malayan rubber exports in June amounted to 95,139 tons. This compares with 92,225 tons in May and 88,122 tons in June of the previous year.

NEW YORK, AUGUST 1, 1961

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM JULY 1 TO JULY 31

July	Spot	July	Sept.	Nov.	Sales
1	....	....	....	....	..
2	....	....	....	....	..
3	29.25	28.90	28.75	28.55	11
4	....	....	....	....	..
5	29.50	29.10	29.14	28.84	14
6	29.38	29.20	29.18	28.80	20
7	29.38	29.25	29.25	28.85	22
8	....	....	....	....	..
9	....	....	....	....	..
10	29.25	29.05	28.90	28.80	9
11	29.25	29.05	28.85	28.75	4
12	29.38	29.15	29.15	29.05	26
13	29.63	29.40	29.40	29.25	3
14	29.63	29.30	29.30	29.20	25
15	....	....	....	....	..
16	....	....	....	....	..
17	29.63	29.50	29.50	29.40	6
18	29.88	29.78	29.78	29.60	16
19	29.75	29.50	29.50	29.40	7
20	29.88	29.55	29.40	29.25	11
21	29.50	29.00	29.40	29.25	23
22	....	....	....	....	..
23	....	....	....	....	..
24	29.25	29.00	29.12	29.00	22
25	29.12	28.78	28.90	28.80	7
26	29.38	29.00	29.29	29.15	1
27	29.38	29.10	29.35	29.21	8
28	29.50	....	29.45	29.35	1
29	....	....	....	....	..
30	....	....	....	....	..
31	29.38	....	29.30	29.06	5

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.29⅜
Sept.	.29¼
Oct.	.29¼
Thin Latex Crepe:	
Spot	.31¾
Thin Brown Crepe, No. 2	.26¼
Flat Bark Crepe	.20

London Market
(Standard Smoked Sheets)

Sept.	28.67 — 28.81
Oct.-Dec.	29.11 — 29.25

Singapore Market
(Standard Smoked Sheets)

Sept.	27.45 — 27.49

Middling Upland Quotations

	June 30	July 31		
	Close	High	Low	Close
Oct.	34.13	34.49	34.48	34.47
Dec.	34.61	34.98	34.94	34.96
Mar.	35.40	35.70	35.68	35.66

Notes & Quotes

Record sales of replacement tires this year will prime the tire industry for the biggest year in its history in 1962, according to Raymond C. Firestone, president of the Firestone Tire & Rubber Co. Mr. Firestone predicted a record of 71 million replacement passenger tires will be sold this year, helping to make 1961 the second best year in history despite the decreases in original equipment sales.

Synthetic Rubber

Consumption of all types of synthetic rubber in the United States in June amounted to 93,200 long tons against 90,564 long tons in May. A new monthly high was established for the ratio of synthetic rubber to total new rubber with a June figure of 72.33 per cent. The previous high of 71.96 per cent had been reached in the previous month.

There are rumors heard in the industry that a price drop in general purpose synthetic rubber is to be expected following the lead of the Polymer Corp. which dropped its Canadian price by 1c per pound. It is said that the price drop, if any, will be made in an attempt to garner a larger share of the domestic market to offset a probable loss in foreign markets.

Price Drop Not in Cards?

Others in the industry do not feel that a price decrease for synthetic rubber is in the cards at this time. Synthetic rubber is still selling at a much lower price than its natural counterpart. Exports, while not at the levels maintained in 1960, are good. As a matter of fact, in the first six months of this year slightly in excess of 150,000 long tons of synthetic rubber were exported from the United States. At this rate, something in the order of 300,000 long tons will be exported in 1961.

What with good domestic consumption of synthetic, good export market, and a rising ratio in the preference of synthetic over natural, it is held that there are few logical reasons for a domestic price drop at this particular time.

Of course, all projections are problematical and subject to political and economic vicissitudes which cannot be foreseen at the moment. It will be remembered that only a few years ago many in the trade were bemoaning the imminent loss of export markets. Time has not borne out this baleful contention.

GSA A Potent Force

It may be that future actions by the General Services Administration in the United States with relation to the natural rubber stockpile will have a good deal to do with synthetic and with synthetic prices. The availability of larger quantities of natural at lower prices may prove a spur to a decline in synthetic prices. The GSA move would have to be major, however, to force the price of natural down sufficiently to warrant a drop in synthetic prices.

There may, however, be readjustments in the specialty rubbers. DuPont recently dropped its prices on a dry neoprene and on a neoprene latex. This may be a small indication of things to come.

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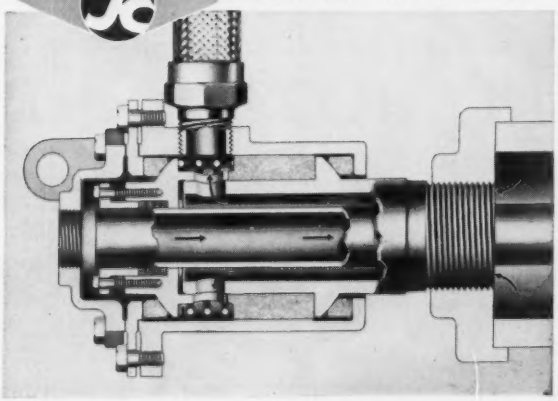

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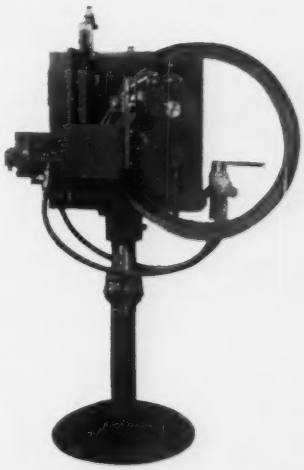

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(per pound carload)

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Butaprene NH	.6500
Butaprene NL	.5000
Butaprene NXM	.5800
Chemigum N3NS and N5	.5800
Chemigum N6	.5000
Chemigum N6B and N7	.5000
Chemigum N8	.5000
Chemigum N600	.5000
Herecol N-33	.6800
Hycar 1001 and 1041	.5800
Hycar 1002	.5000
Hycar 1014	.6000
Hycar 1042 and 1043	.5000
Hycar 1051	.5800
Hycar 1052	.5000
Hycar 1053	.5000
Hycar 1072	.6400
Hycar 1203	.4600
Hycar 1312	.5000
Hycar 1411	.6200
Hycar 1432	.5900
Hycar 1441	.6200
Paracril AJ	.4850
Paracril B and BJ	.5000
Paracril BLT and BJLT	.5000
Paracril C and CLT	.5800
Paracril CV	.6300
Paracril D	.6500
Paracril 18-80	.6000
Paracril OZO	.4600
Polysar Krynac 800	.5000
Polysar Krynac 801 and 805	.5800
Polysar Krynac 802	.5000
Polysar Krynac 803 and 804	.5000

Butadiene-Styrene Types

Ameripol 1002	.2435
Ameripol 1006	.2410
Ameripol 1006 (crumb)	.2475
Ameripol 1007	.2410
Ameripol 1009	.2475
Ameripol 1009 (crumb)	.2590
Ameripol 1011	.2475
Ameripol 1012	.2425
Ameripol 1012 (crumb)	.2490
Ameripol 1013	.2410
Ameripol 1013 (crumb)	.2615
Ameripol 1500 and 1501	.2410
Ameripol 1502	.2410
Ameripol 1509 and 1511	.2410
Ameripol 1000 and 1001	.2410
Ameripol 1605	.1900
Ameripol 1606	.1820
Ameripol 1608	.1845
Ameripol 1609	.2080
Ameripol 1610	.1870
Ameripol 1703	.2060
Ameripol 1705	.2035
Ameripol 1707	.1910
Ameripol 1708	.1910
Ameripol 1710	.1885
Ameripol 1712	.1885
Ameripol 1805	.1550
Ameripol 1808	.1480
Ameripol 1809	.1545
Ameripol 1810	.1400
Ameripol 4600 and 4601	.2410
Ameripol 4604	.2410
Ameripol 4651	.1770
Ameripol 4659	.1820
Ameripol 4660	.1870
Ameripol 4664	.1845
Ameripol 4667	.2080
Ameripol 4700	.1750
Ameripol 4756	.1545
Ameripol 4758	.1450
Ameripol 4759	.1598
Ameripol 4760	.1576
Ameripol 4761	.1710
ASRC 1000	.2410
ASRC 1001 and 1004	.2410
ASRC 1006	.2410
ASRC 1009	.2475
ASRC 1018	.2700
ASRC 1019	.2650
ASRC 1500 and 1502	.2410
ASRC 1503	.2625
ASRC 1703	.2060
ASRC 1708	.1910
ASRC 1712	.1885
ASRC 1713	.1750
ASRC 3105 and 3106	.2410
ASRC 3110	.2600
B-123	.1820
Baytown B-129	.1960
Baytown B-134	.1900
B-142	.1515
Baytown B-172	.1825
Baytown 1600	.1930
Baytown 1601	.1930
Baytown 1602	.1930
Baytown 1606	.1820
Baytown 1608	.1845
Baytown 1609	.2080
Baytown 1801	.1760
Baytown 1803A	.1740
Baytown 1805A	.1550
Baytown 1808	.1480
Baytown 1809	.1545
Baytown 1811	.1569
Baytown 1813	.1640
Baytown 1815	.1496
Baytown 1816	.1580
Baytown 8600	.2410
Baytown 8676	.1876
Baytown 8679	.2022
Baytown 8681	.1835
Baytown 8682	.1890
Baytown 8700	.1885
Baytown 8775	.1545
Baytown 8776	.1679
Baytown 8781	.1655
Baytown 8782	.1583
Baytown 8783	.1515
Baytown 8784	.1598
-102 (Shell)	.2300
Carbomix 1606	.1820
Carbomix 1608	.1845
Carbomix 1609	.2080
Carbomix 1808	.1480
Carbomix 1809	.1545
Carbomix 1811	.1569
Carbomix 1813	.1640
Carbomix 1814	.1545
Carbomix 1815	.1496
Carbomix 1817	.1715
Carbomix 3761	.1576
Carbomix 3764	.1685
CB-102 (Shell)	.1850
Copo 1006	.2410
Copo 1500	.2410
Copo 1502	.2410
Copo 1505-NS	.2610
Copo 1507	.2410
Copo 1510	.2410
Copo 1712	.1885
Copo 1713	.1750
Copo 1714	.1725
Copo 1778	.1910
FR-S 146	.2410
FR-S 158	.3000
FR-S 173	.2060
FR-S 178	.1910
FR-S 181 and 182	.2410
FR-S 184	.1885
FR-S 1000	.2410
FR-S 1001	.1410
FR-S 1004 and 1006	.2410
FR-S 1007	.2410
FR-S 1009	.2475
FR-S 1010	.2600
FR-S 1012	.2425
FR-S 1013	.2410
FR-S 1014	.2810
FR-S 1500 and 1502	.2410
FR-S 1703	.2060
FR-S 1710 and 1712	.1885
Gentro 1500	.2410
Gentro 1712	.1885
Gentro-Jet 9152	.2080
Gentro-Jet 9153	.1820
Gentro-Jet 9154	.1845
Gentro-Jet 9250	.1580
Gentro-Jet 9251	.1640
Gentro-Jet 9252	.1670
Gentro-Jet 9275	.1500
Naugapol 1015	.3500
Naugapol 1016	.2650
Naugapol 1018	.2700
Naugapol 1019	.2650
Naugapol 1022	.3050
Naugapol 1023	.3300
Naugapol 1503	.2625
Naugapol 1504	.3500
Naugapol 6003	.2700
Naugapol 6100	.3200
OB-102 (Shell)	.1825
OB-104 (Shell)	.1475
OB-106 (Shell)	.1510
OB-110 (Shell)	.1410
OB-111 (Shell)	.1540
OB-113C (Shell)	.1750
OB-114C (Shell)	.1420
OB-116 (Shell)	.1810
Philprene 1000	.2410
Philprene 1006	.2410
Philprene 1009	.2475
Philprene 1018	.2700
Philprene 1019	.2650
Philprene 1500 and 1502	.2410
Philprene 1503	.2625
Philprene 1601	.1930
Philprene 1603	.1960
Philprene 1605	.1900
Philprene 1606	.1820
Philprene 1608	.1845
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Philprene 1703	.2060
Philprene 1708	.1910
Philprene 1712	.1885
Philprene 1803	.1740
Philprene 1805	.1550
Philprene 1808	.1480
Plioflex 1006	.2410
Plioflex 1500C	.2410
Plioflex 1502	.2410
Plioflex 1507	.2410
Plioflex 1508	.2410
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Plioflex 1712C	.1885
Plioflex 1713	.1750
Plioflex 1714C	.1725
Plioflex 1773	.2060
Plioflex 1778	.1910
Polysar Kryflex 200	.2510
Polysar Kryflex 202	.2535
Polysar Kryflex 252	.2700
Polysar Krylene, NS and 602	.2410
Polysar Krynol 651 and 653	.1885
Polysar Krynol 652 and 654	.1910
Polysar Krynol 655	.1885
Polysar S and S-630	.2410
Polysar SS-250	.2875
Polysar S-X370	.2475
Polysar S-X371	.2550
S-1000	.2410
S-1002	.2435
S-1006	.2410
S-1009	.2475
S-1011	.2475
S-1013	.2410
S-1500	.2410
S-1502	.2410
S-1509	.2410
S-1703	.2060
S-1707	.1910
S-1709	.1885
S-1710	.1885
S-1712	.1885
S-1778	.1910
S-7501	.2410
S-7652	.1960
S-7702	.1750
SP-102	.3000
SP-103	.3000
Synpol 1000 and 1001	.2410
Synpol 1002	.2435
Synpol 1006	.2410
Synpol 1007	.2410
Synpol 1009	.2475
Synpol 1012	.2425
Synpol 1013	.2410
Synpol 1061	.2410
Synpol 1500	.2410
Synpol 1502	.2410
Synpol 1551	.2410
Synpol 1703	.2060
Synpol 1707 and 1708	.1910
Synpol 1712	.1885
Synpol 8103	.2401
Synpol 8151	.1820
Synpol 8152	.1860
Synpol 8200	.1910
Synpol 8201	.1750
Synpol 8202	.1725
Synpol 8208	.1750
Synpol 8255	.1480
Synpol 8253	.1584
Synpol 8254	.1545
Synpol 8266	.1598
Synpol 8267	.1640

Butyl Rubbers

Enjay Butyl 035 and 150	.2300
Enjay Butyl 165 NS	.2400
Enjay Butyl 215 and 217	.2300
Enjay Butyl 218	.2300
Enjay Butyl 268 NS	.2400
Enjay Butyl 325	.2300
Enjay Butyl 365 NS	.2400
Enjay Butyl 10-65 and 10-66	.3000
Enjay Butyl 10-67	.3000
Polysar Butyl 100 and 200	.2300
Polysar Butyl 101	.2775
Polysar Butyl 300 and 301	.2300
Polysar Butyl 400, 402, 450	.2400
Polysar Butyl 600	.2750

SYNTHETIC RUBBER POLYMERS

Chlorosulfonated Polyethylene

Hypalon 20	.4700 [3]
Hypalon 30	.6000 [3]
Hypalon 40	.5000 [3]

Fluoroelastomers

Fluorel	$10.25 [2]
Kel-F 3700 and 5500	$16.00 [2]
Viton A and A-HV	$10.00 [2]
Viton B	$10.00 [2]

Isoprene Rubber

Shell 300 and 305	.2500 [2]
Shell 307	.2600 [2]
Shell 500	.2150 [2]

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500 [3]
Neoprene Type AD	.5500 [3]
Neoprene Type FB	.6500 [3]
Neoprene Type GN	.4100 [3]
Neoprene Type GN-A	.4100 [3]
Neoprene Type GRT	.4200 [3]
Neoprene Type KNR	.7500 [3]
Neoprene Type S	.4200 [3]
Neoprene Type W	.3900 [3]
Neoprene Type WB	.4100 [3]
Neoprene Type WHV	.3700 [2]
Neoprene Type WRT	.4500 [4]
Neoprene Type WX	.4100 [3]

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.6000 [2]
Thiokol Type FA	.7400 [2]
Thiokol Type ST	1.2500 [3]

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.50 [3]
GE Silicone Gum (not compounded)	4.00 [3]
Silastic (compounded)	2.56 [3]
Silastic (gums)	4.00 [3]
Union Carbide (gums)	4.00 [3]
Union Carbide (compounds)	2.50 [3]

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [1]
Butaprene N-400 and N-401	.5400 [1]
Chemigum 200	.4800 [3]
Chemigum 235	.5300 [3]
Chemigum 236	.5300 [3]
Chemigum 245	.4500 [3]
Chemigum 246	.4500 [3]
Chemigum 247	.4500 [3]
Chemigum 248	.4500 [3]
Hycar 1512	.4500 [3]
Hycar 1551	.5300 [3]
Hycar 1552	.4500 [3]
Hycar 1561	.5300 [3]
Hycar 1562	.4500 [3]
Hycar 1571	.5300 [3]
Hycar 1572	.4500 [3]
Hycar 1577	.4500 [3]
Nitrex 2612	.4500 [1]
Nitrex 2616	.5300 [1]
Nitrex 2620	.4500 [1]
Nitrex 2625	.4500 [1]
Tylac 640 and 650	.4500 [1]
Tylac 750	.4900 [3]
Tylac 850	.5300 [1]
Tylac 1640 and 1650	.5400 [1]

Butadiene-Styrene Types

CL-101 (Shell)	.2800 [3]
Copo 2000	.2750 [3]
Copo 2101	.3000 [3]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3000 [3]
Copo 2109	.2775 [3]
Copo 2110	.3200 [3]
Copo 3852	.3000 [3]
FR-S 110	.3000 [3]
FR-S 150	.3000 [3]
FR-S 151	.2900 [3]
FR-S 174	.2950 [3]
FR-S 176	.2775 [3]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]
FR-S 2004	.3050 [3]
FR-S 2006	.2900 [3]
FR-S 2105	.3200 [3]
Naugatex 2000 and 2001	.2750 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [4]
Naugatex 2105 and 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Naugatex 2113	.2900 [1]
Naugatex J-8174-F	.3200 [1]
Naugatex J-8855	.3000 [1]
Naugatex J-9049	.2750 [3]
Naugatex J-9064	.3050 [1]
Pliolite 2000 and 2001	.2775 [2]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105 and 2107	.3200 [2]
Pliolite 2108	.3000 [3]
S-2000 and S-2006	.2600 [3]
S-2101	.2600 [3]
S-2105	.2800 [3]
S-2108	.2900 [3]
Tylac 400	.3000 [3]
Tylac 405, 430, 450-A	.2750 [1]
Tylac 410 and 420	.2900 [1]
Tylac 450-A	.2750 [3]
Tylac 3040 and 3340	.3200 [1]

Butyl

Butyl Latex 80-21	.3500 [2]

Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 673	.5000 [3]
Neoprene Latex 735	.3800 [3]
Neoprene Latex 736	.3800 [2]
Neoprene Latex 842-A	.3500 [2]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.8000 [3]
Thiokol Type WD-2	1.2500 [3]
Thiokol Type WD-6	.8000 [3]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

Suppliers are your Materials Listed in the Market Prices Section?
If not, forward full information to —
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MARKETS

(continued)

Reclaimed Rubber

Figures made available by the Rubber Manufacturers Association indicate that in the first half of this year 133,344 long tons of reclaimed rubber were produced in the United States. This compares with the 159,892 long tons produced in the first half of the previous year.

In the first six months of the current year, 126,195 long tons of reclaimed rubber were consumed in the United States, about 25,000 long tons less than in the first half of the previous year when 150,525 long tons were consumed.

With rather a poor first half, the question now is: what kind of second half will reclaim have? Indications are, at this point, that it will be better. The economy as a whole is pulling out of the doldrums, automobile production is up. Accordingly, 1961 consumption should be in the order of 270,000 long tons.

(Prices for All Areas Except West Coast)
(Average price, carload quantities, minimum freight allowed)

	per lb.
First Line Whole Tire	.11½
First Line Whole Tire Stainless	.12¼
Second Line Whole Tire	.11
Third Line Whole Tire	.10¾
Fourth Line Whole Tire	.10¼
Black Carcass	.15¾
Peelings	.11½
Butyl Tube	.16
Natural Rubber Black Tube	.17
Natural Rubber Red Tube	.21
Mechanical, Light Color, Low Gravity	.26
Mechanical, Light Color, Medium Gravity	.20

Scrap Rubber

The movement of scrap rubber continues in a moderate fashion with consumption running at a pace just slightly below the previous year. The Rubber Manufacturers Association reports that in the first six months of 1961 a total of 124,460 long tons of scrap rubber was consumed in the United States

At this point last year, about 146,000 long tons had been consumed and 60,000 long tons were in stock. As of the end of June, 1960, 66,590 long tons were in stocks on hand. Current price levels are steady and generally unchanged.

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.06
No. 1 peelings	ton	38.00
No. 2 peelings	ton	27.00
No. 3 peelings	ton	20.00
Buffings	ton	14.00
Truck and Bus S.A.G.	ton	20.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.08
Natural Rubber Black Tubes	lb.	.07
Butyl Rubber Tubes	lb.	.07¼

Tire Fabrics

It remains problematical whether acrylonitrile price cuts recently announced by American Cyanamid Co., and competitors, among them Standard Oil Co. of Ohio and Union Carbide, will have any effect on the cost of acrylic fibers, such as Orlon, Acrilan, Dynel and Creslan.

American Cyanamid announced that effective July 1 its price for acrylonitrile would be reduced from 23 cents to 14½ cents per pound. Competitors indicated that their pricing would remain competitive.

Most acrylic fiber producers make their own acrylonitrile. DuPont, for instance, indicated that the recently announced cut would have no effect on the price of Orlon.

Meanwhile, Beaunit Mills reported that it is continuing development work on a polyester tire cord which it is hoped will have the strength of nylon but not its tendency to stretch.

The Beaunit research is being carried on in cooperation with Goodyear Tire & Rubber Co., and the firms expect to know within six or seven months whether the polyester tire cord is possible.

If it is, production will begin immediately at existing facilities. Beaunit is currently a major producer of Tyrex, the rayon tire cord.

Production Figures

Production of tire cord and cord fabric in the first quarter of 1961 totaled 87,556,000 pounds, an increase of 4 per cent over the fourth quarter of 1960.

Specifically, rayon increased 3 per cent, up from 54,388,000 pounds to 56,287,000 pounds. Nylon was up 6 per cent to 30,512,000 pounds, and cotton up 5 per cent to 757,000 pounds.

With cotton remaining nominal, first quarter production was 65 per cent rayon and 35 per cent nylon. For the calendar year 1960, rayon represented 63 per cent and nylon 37 per cent of the 378,691,000 man-made fiber total.

(Prices f.o.b. Shipping Points)

Rayon Tire Cord

1100	lb.	.57
1650	lb.	.51
2200	lb.	.50

Nylon Tire Cord

840	lb.	.92
1680	lb.	.92

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63¼
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.72
11.65 oz. (per square yard)	lb.	.66
14.4 oz. (per square yard)	lb.	.75

Liquid Latex

Natural: The figures for the first six months of this year are in and according to the Rubber Manufacturers Association, 21,413 long tons of natural rubber latex were imported into the United States in that period as opposed to the 29,928 long tons which were imported into the United States in the first six months of 1960.

Consumption is also running behind. In the first six months of the current year 20,924 long tons were consumed against the 27,149 long tons consumed in the first half of last year.

Natural rubber latex is currently selling at a 36 to 37c per pound level at East Coast ports in car load lots. This is a slight increase over the preceding month. By past accounts, natural rubber latex will have a relatively poor year in 1961 with consumption of approximately 42,000 long tons. There is nothing on the horizon to indicate at this point that the situation will materially improve with the coming of 1962.

Synthetic: This segment of the market continues its daily operations in a healthy statistical position. One producer has announced a price drop for one of its latices and the trade is now looking about for some indication of whether this signifies a trend or a unique situation. The price situation aside, the synthetic latices continue to make progress and apparently at the expense of their natural counterpart.

Cotton

The price of middling uplands on the New York Cotton Exchange moved in the extremely narrow range of 40 points since our last report (July 5), high for the period being 35.00c reached on July 21 and on six other days during the month, and low being 34.60c reached on July 3 and 5. The average price of middling uplands for the month of July was 34.82c based on 20 trading days. This compares with an average of 34.44c in the previous month.

Cotton prices virtually stood still during the past month. There was sporadic demand but also a small amount of hedge selling. Spot prices in the South gradually moved higher approaching 1961-62 loan levels.

The demand for gray goods has improved and substantial business was done for fourth quarter delivery as a result of stepped-up military requirements.

Last year, for the first time in history, the machine moved ahead of man in harvesting cotton with 51 per cent of the crop harvested mechanically. In 1959, 43 per cent was harvested mechanically.

The National Cotton Advisory Committee met during the period and will meet again this coming Fall in an attempt to come up with new cotton legislation. A two-fold problem exists in that any legislation must not cut farm income and not increase costs to the taxpayer.

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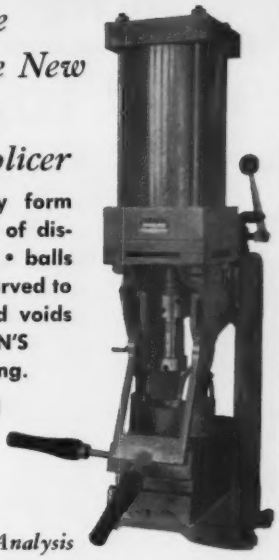

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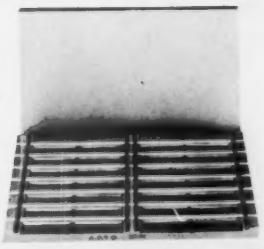

D813, Fig. 3 DeMattia, Flex Test.

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MARKET PRICES

CHEMICALS & COMPOUNDING INGREDIENTS

AUGUST 1, 1961

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carload; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l., less than carload; M.B. masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

***Trademark. †For Export Only.**

The arrangement of this section closely follows the Chemical Section of the 1961 RUBBER RED BOOK. Readers are referred to that edition for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)*	lb.	.74	.81
A-32*	lb.	.66	.80
A-100*	lb.	.52	.66
Accelerator No. 8*	lb.	—	1.25
Accelerator—49*	lb.	.60	.61
Accelerator 108*	lb.	—	.92
Accelerator—552*	lb.	—	2.25
Accelerator—808*	lb.	.66	.68
Accelerator—833*	lb.	1.17	1.19
Accelerator B*	lb.	—	.92
Altax*	lb.	.54	.56
Amax*	lb.	.75	.77
No. 1*	lb.	.71	.73
Ancap*(†)	lb.	.38	.40
Ancatax*(†)	lb.	.48	.50
Ancazate BU (ET & ME)*(†)	lb.	—	1.07
Ancazide ET*(†)	lb.	—	1.07
ME*(†)	lb.	—	1.14
Arazate*	lb.	—	2.25
Arquad 12*	lb.	.55	.61
Beutene*	lb.	.66	.68
Bismate, Rodform*	lb.	—	3.00
Butazate 50D*	lb.	.87	.89
Butyl Eight*	lb.	1.10	1.35
Butyl Namate	lb.	.45	.50
Captax*	lb.	.44	.46
C-P-B*	lb.	—	1.95
Cumate, Rodform*	lb.	—	1.45
Cydac*	lb.	.71	.73
Delac S*	lb.	.71	.73
DIBS*	lb.	—	.85
Diorthotolyguanidine	lb.	.69	.70
Dipac*	lb.	—	.85
Diphenylguanidine	lb.	.51	.52
Dithiocarbamates			
Cyzate B & E	lb.	.85	.89
El-Sixty*	lb.	.62	.69
Ethazate*	lb.	—	1.04
50D*	lb.	.87	.89
Ethyl Thiurad*	lb.	—	1.04
Ethyl Tuex*	lb.	—	1.04
Ethylac*	lb.	.93	.95
Geigy Amines	lb.	.46	.52
Guantal*	lb.	.62	.69
Hepteen Base*	lb.	—	1.85
Kure-Blend MT*	lb.	—	.70
Ledate, Rodform*	lb.	—	1.04
MBT-XXX*	lb.	.55	.57
MBTS Grains*	lb.	.54	.56
Merac*	lb.	.75	1.05
Mercaptobenzothiazol	lb.	.44	.46
Mercaptobenzothiazyl Disulfide	lb.	.54	.56
Mertax*	lb.	.50	.57
Methazate*	lb.	—	1.04
Monex*	lb.	—	1.14
Mono Thiurad*	lb.	—	1.14
2-MT	lb.	.88	.90
NA-22* (for neoprene)	lb.	—	1.05
NOBS No. 1*	lb.	.71	.73
Special*	lb.	.75	.77
O-X-A-F	lb.	.55	.57
Pennac SDB*	lb.	.45	.48
Pentex*	lb.	—	1.24
Flour*	lb.	—	.30
Permalux (Neoprene)*	lb.	—	2.25
Phenex*	lb.	.60	.65
Polyac*	lb.	—	1.85
R-2 Crystals*	lb.	—	4.35
Rotax*	lb.	.50	.52
RZ-50-A* and B*	lb.	.70	1.00
Santocure*; NS*	lb.	.71	.78
.26*	lb.	.75	.82
Selenac* (Ethyl, Methyl)	lb.	—	3.00
Seleram, Ethyl	lb.	—	3.00
Setsit-5*	lb.	.75	1.05
9*	lb.	.85	1.15
SPDX-GH*	lb.	.77	.79
GL*	lb.	1.20	1.30
Tellurac*	lb.	—	1.75
Tellurac Rodform (80%)	lb.	—	1.40
Tepidone*	lb.	.45	.45
Tetrone A*	lb.	—	1.98
Thiate A*	lb.	.88	—
B*	lb.	1.05	1.25
Thiazole ZMBT	lb.	.55	.57
Thiofide*	lb.	.54	.61
Thionex*	lb.	—	1.14
Thiotax*	lb.	.44	.51
Thiram, Ethyl	lb.	—	1.04
Methyl	lb.	—	1.14
Thiurad*	lb.	—	1.14
Thiuram E*	lb.	—	1.04
M*	lb.	—	1.14
Cyuram DS & MS	lb.	1.14	1.14
Trimene*	lb.	.56	.58
Base*	lb.	1.03	1.06
Triphenyl Guanidine	lb.	—	.90
Tuads* (Ethyl)	lb.	—	1.04
Tuads* (Methyl)	lb.	—	1.14
Tuex*	lb.	—	1.14
Ultex*	lb.	1.15	1.20
Unads*	lb.	—	1.14
Vulcacure NB*	lb.	.45	.45
NS*	lb.	.75	1.05
TMD*	lb.	—	1.14
ZB*, ZE*, ZM*	lb.	.85	.89
Z-B-X*	lb.	—	2.45
Zenite*	lb.	.54	.56
Zenite A*	lb.	.69	.71
Zenite AM*	lb.	.76	.78
Zenite Special*	lb.	.55	.57
Zetax* (uncoated)	lb.	.55	.57
Zimate* (Butyl)	lb.	—	1.04
Zimate* (Ethyl)	lb.	—	1.04
Zimate* (Methyl)	lb.	—	1.04
Zimate Slurry 50% solids content (Butyl, Ethyl & Methyl)	lb.	.85	.89
Ziram, Butyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Ethyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Methyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89

ACTIVATORS

Blue Lead Sublimed	lb.	.17	.18
Cottonseed Fatty Acids			
Drew Wecoline C*	lb.	.17¾	.19
Wochem 210* and 211*	lb.	.16	.18½
Fish Oil, Hydrogenated, Fatty Acid			
Century Hydrex 440	lb.	.11½	.14
DAR-S*	lb.	.09¾	.12¼
DAR-HY*	lb.	.15½	.18
Groco 56*	lb.	.11½	.14
Hydrofol Acids*	lb.	.11	.20½
Hyfac 430*	lb.	.16¼	.18¾
Neo-Fat H.F.O.*	lb.	.14½	.15¾
Neutrex*	lb.	.15	.17½
Stearite*	lb.	.11¾	.14¼
Talene*	lb.	.16¼	.18¾
Wecoline 200*	lb.	.14¾	.16
1000*, 1500*	lb.	.12	.13¼
Wochem 730*	lb.	.09¾	.12¼
731*	lb.	.15½	.18
732*	lb.	.16½	.19
Lime, Hydrated			
Arrowhead*	ton	—	21.00
Marblehead*	ton	—	19.25
Sierra*	ton	—	22.50
Litharge			
Eagle-Pitcher* (c.l.)	lb.	.13¾	—
National Lead*	lb.	—	.13¾
SB*	lb.	—	.18½

ACTIVATORS (Cont'd)

Magnesium Oxide, Heavy			
DCI 601*	lb.	.25¼	—
General Magnesite 500*	lb.	.05½	.06
600*	lb.	.06½	.07
Kaiser 325*	lb.	.03½	.06½
Michigan No. 15*	lb.	.05½	.06½
Morton's Magnesia	lb.	.25¼	—
Magnesium Oxide, Light			
Carey Mag*	lb.	.25¼	.26
DCI Technical*	lb.	.21½	.23½
General Magnesite* (neoprene grade)	lb.	.26¾	.28¾
General Magnesite No. 101*	lb.	.24¾	.27¼
Genmeg MLW*	lb.	.25¼	.27¾
Light Calcined Magnesia			
No. X-01*	lb.	.25¼	.26
Maglite D*	lb.	.23½	.25
K* & Y*	lb.	.23½	.25
L*	lb.	.29¾	.30¾
M*	lb.	.27	.28½
Seamag*	lb.	.20	.20½
Marmag*	lb.	.24¾	.26
Michigan No. 30*	lb.	.24¼	.26½
Michigan 1782 Magnesia*	lb.	.25¼	.26½
Neomag Powder*	lb.	.29¼	.30
Pellets*	lb.	.31¼	.32
Oleic Acid			
Dar-Chem* 105	lb.	.17½	.20
Drew Wecoline OO*	lb.	.17¾	.19
Emersol 210*	lb.	.18	.20½
Groco Red Oil	lb.	.18	.20½
Neo-Fat 92-04*	lb.	.20½	.22½
94-04*	lb.	.18½	.20½
Wochem 310, 311	lb.	.17½	.20
Palm Fatty Acids			
Groco 45*	lb.	.15½	.18
Neo-Fat*	lb.	.15¼	.17¾
Wochem 280*	lb.	.15½	.18
281*	lb.	.16	.18½
Potassium Oleate (dms.)	lb.	.48	.73
Drew 24%*	lb.	.20	.73
Red Lead			
Eagle-Picher* (c.l.)	lb.	.14¼	—
National Lead*	lb.	.14¼	.14¾
No. 2 RM*	lb.	—	.18½
Sodium Laurate, 75%	lb.	.64	.89
Sodium Oleate, 75%	lb.	.54	.79
Paste (dms.)	lb.	.39	.64
Sodium Stearate, 75%	lb.	.47	.72
Stearic Acid, Single Pressed			
Century 1210*	lb.	.16¾	.19¼
Dar-Chem 11*	lb.	.16¼	.18¾
Emersol 110*	lb.	.16¾	.19¼
Neo-Fat 18-53*	lb.	.14¾	.16¾
Stearic Acid, Double Pressed			
Century 1220*	lb.	.17¼	.19¾
Dar-Chem 12*	lb.	.16¾	.19¼
Emersol 120*	lb.	.17¼	.19¾
Groco 54*	lb.	.17¼	.19¾
Neo-Fat 18-54*	lb.	.15¼	.17¾
Stearic Acid, Other			
Century 1230*	lb.	.19	.21½
1240-Supra*	lb.	.19	.21½
Extra Pearlstearic*	lb.	.17½	.20
Neo-Fat 18*	lb.	.18½	.20½
18-58*	lb.	.14¼	.16¾
18-61*	lb.	.16¼	.18¾
Stearex*	lb.	.11¾	.13
Stearite*	lb.	.11¼	.13¾
Wecoline 300*	lb.	.15¼	.16½
Wochem 720*	lb.	.11¼	.13¾
721*	lb.	.11½	.14
White Lead Basic Carbonate	lb.	.18	.19
White Lead Basic Sulfate	lb.	.17	.18
Zinc Laurate			
Laurex*	lb.	.37	.39
Zinc Stearate	lb.	.41	.46
Aquazinc K.C.*	lb.	.30	.55
Crown Brand*	lb.	.39	.44

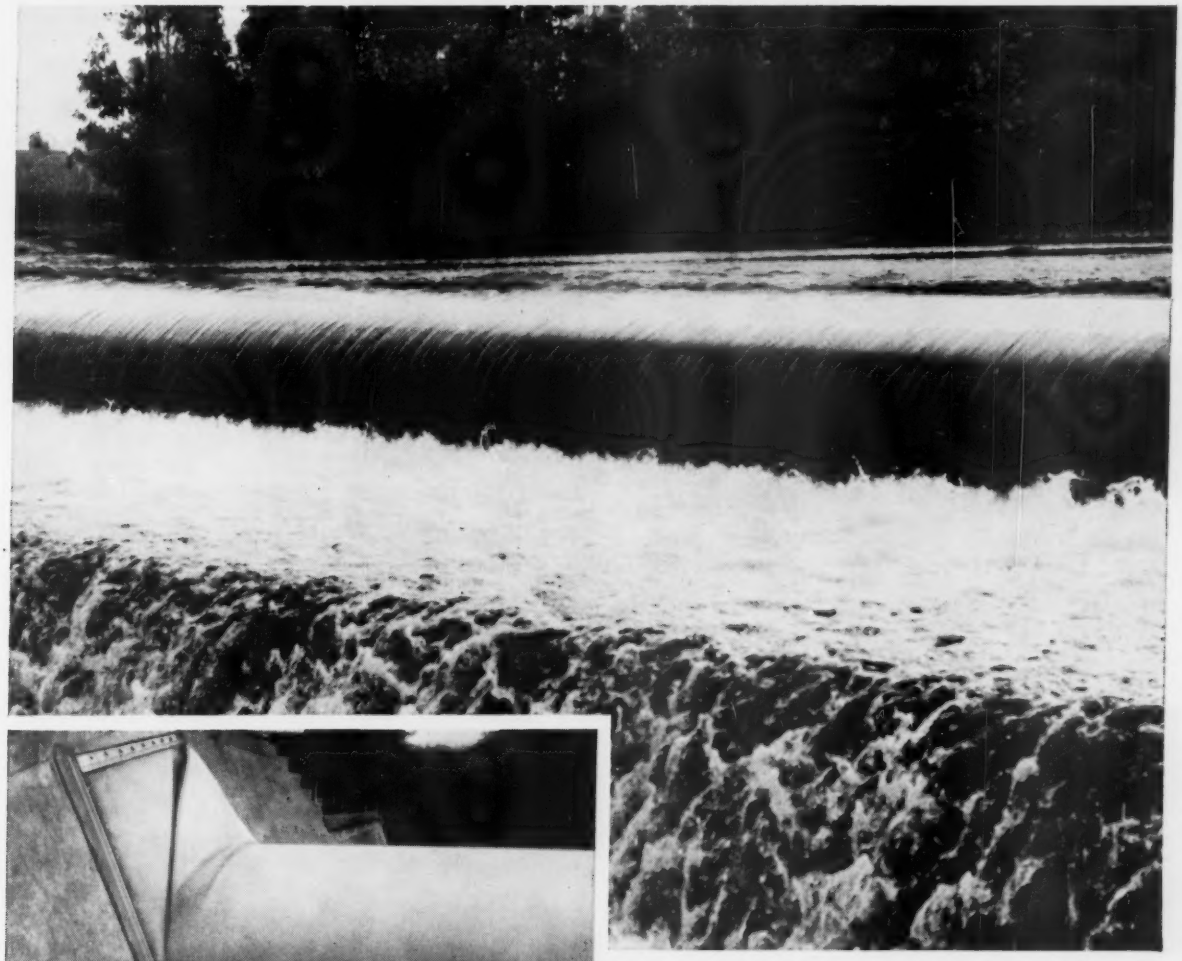
Unclassified Activators

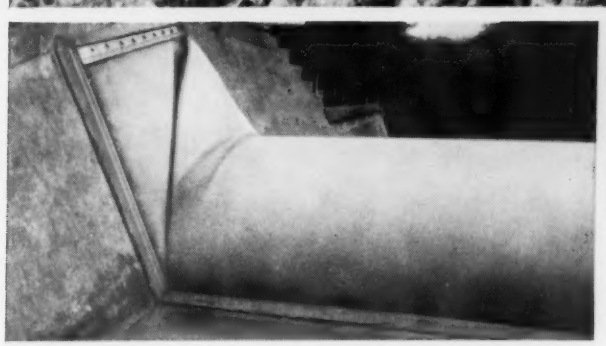
Aktone*	lb.	.21¼	.23¼
Barak*	lb.	—	.65
Curade*	lb.	.57	.59
DCI Magnesium Carbonate*	lb.	.11	—
Dibenzo G-M-F	lb.	—	2.60
D-B-A*	lb.	—	1.95
G-M-F*	lb.	—	2.60
Dibutylamine (dlvd.)	lb.	.55½	.56½
MODX*	lb.	.38	.40
Neo Fat 42-07*	lb.	.10¾	.12¼
Ridacto* (dms.)	lb.	.25	.26
Snodotte* (dlvd.)	lb.	.18½	.21
Vimbra	lb.	.32	.38½
Vulklor*	lb.	.88	.98

ANTI-COAGULANTS

Aqua Ammonia* (dms.)	lb.	.031	.035
M.B.M.C.* (l.c.l.)	lb.	.54	.76

Revolutionary fabric dam inflates, deflates to control flow of water





Left: view of one end of inflated Waialua Fabridam before rains raised reservoir level. Easily installed on concrete foundation.

Above: water flows over Fabridam, from Wahiawa Reservoir into tunnel leading to plantation, at rate of 175 million gallons per day.

Irrigating the ten thousand acres of sugar cane under cultivation by the Waialua Agricultural Company, Ltd., of Waialua, Hawaii, takes more than 25 billion gallons of water a year. To conserve extra water available during wet periods, a remarkable new "Imbertson Fabridam by Firestone" was installed in the spillway of the Wahiawa Reservoir.

Far less costly than conventional control gates, this light, flexible fabric dam increases the storage capacity of the reservoir by 500 million gallons. During the rainy season, it automatically deflates sufficiently to prevent flooding.

Wellington Sears supplied the nylon base fabric used by the Coated Fabrics Division of The Firestone Tire & Rubber Company for the Fabridam. With a tough neoprene coating, it has outstanding resistance to deterioration from age and abrasion—for a life expectancy of 15 years.

This is but another demanding use which Wellington Sears fabrics serve. We have wide experience in engineering cotton and synthetic fabrics to specific jobs—and are always ready with sound technical assistance. For a copy of our illustrated booklet, "Fabrics Plus," write Dept. G-8.

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Copolymer

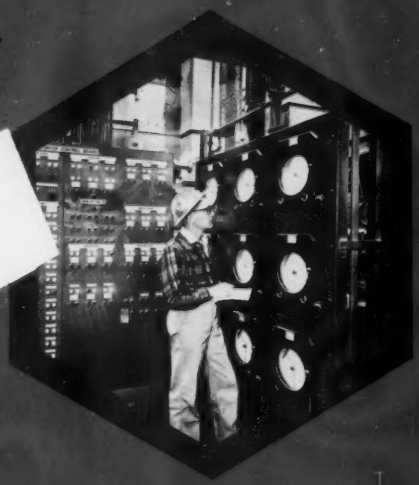
PICTURES OF PROGRESS

CLOSE-UP

TWO NEW AUTOMATIC PRODUCTION LINES

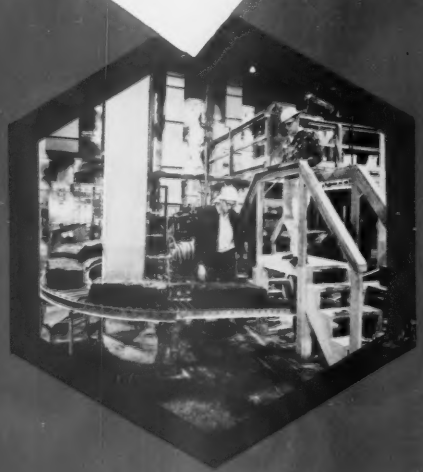
Greater accuracy . . . increased production capacities . . . new standards of quality and uniformity—these are the extra customer benefits which have resulted from the addition of two new production lines at Copolymer!

Of the two new facilities, one will produce both Carbomix® black masterbatches and Copo® non-pigmented polymers of staining types. The second line is devoted exclusively to the production of Copo® non-pigmented polymers of non-staining types.

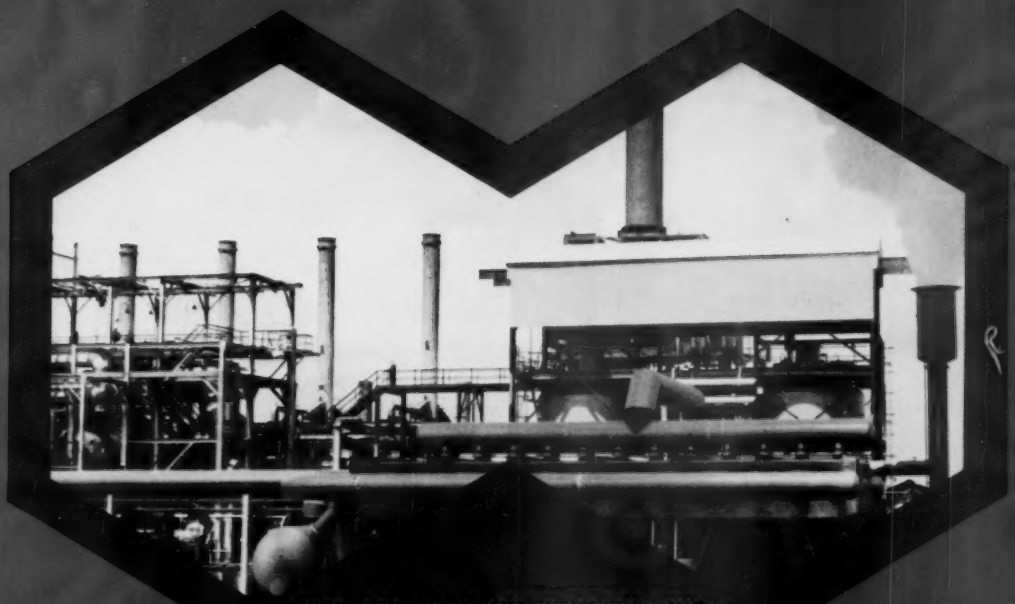


Due to this method of production, Copolymer continues to be one of the leaders by providing customers with non-staining rubbers free from the impurities and contamination caused when production lines are alternated from staining to non-staining types.

These expanded automatic facilities —part of the continuing growth at Copolymer—mean greater production capacities to meet the increased demands for Carbomix®. They mean greater product uniformity and purity, too—due to longer production runs with more exacting control of operational variables.



Copo® and Carbomix® are registered trade-marks of Copolymer Rubber and Chemical Corporation.



NEW DOW CATALYST BUTADIENE UNIT— 2nd BUILT IN THE U.S.

Planned growth and progress at Copolymer include the on-stream operation of the new Dow catalyst process for producing butadiene.

One of two such installations in the nation, the process was built to augment Copolymer's existing production facilities . . . and has boosted its butadiene production by 50%—providing a steady, readily-available uniform raw material supply.

These are Pictures of Progress . . . of Copolymer's constant search for the "better way" to provide customers with the quality rubber they want—when and where they want it.

Copolymer

RUBBER & CHEMICAL CORPORATION

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Your Copolymer representative can help you with a recommendation of the best Copolymer product for your manufacturing use.

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Grant Rickard	Atlanta, Georgia PLaza 3-7833
B. G. Hutchison	Chicago, Illinois SKyline 5-7095
A. E. "Art" Bailey	Hartford, Connecticut CHapel 7-5731
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HALLCO NEWS

Issued by
The C. P. Hall Co.
Chemical Manufacturers

No. 17

LOW TEMPERATURE PLASTICIZER FOR VINYL AND RUBBER

Dioctyl Azelate C-498 is an ester-type technical grade plasticizer, low in volatility and in water extractions. It imparts good light and heat stability and is highly recommended for calendered films, sheets, coated films, dispersions, plastisols and extrusions. Users report that C-498 is an excellent softening agent for synthetic rubbers, especially the nitrile type. C-498 is manufactured by: The C. P. Hall Co.

LOW COST PLASTICIZER AND WETTING AGENT FOR VINYL AND RUBBER

Another quality plasticizer, C-325 is reported to do many jobs at lower cost with smaller amounts needed. It is a primary plasticizer for nitro-cellulose, chlorinated rubber, polystyrene and other synthetics, imparts permanent flexibility. C-325 also is ideal as a secondary softener for many vinyl resins. As a wetting agent for colors and pigments it produces a finer grind, more stable dispersion, and serves as an effective anti-livering agent. For nitrile type rubbers, C-325 is a good low temperature plasticizer, producing compounds that will pass the ASTM Test at temperatures to —65° C. It is manufactured by: The C. P. Hall Co.

Be Accurate: Call it PARA-FLUX® only if it came from The C. P. Hall Company

The C. P. Hall Co.
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5-5175	7-4600	6-8253	5-6666	0-2211	2-2652

ANTI-FOAMING AGENTS

Aero Anti Foam H*	lb.	——	.20
Regular*	lb.	——	.12
Anhydrol 6991*	lb.	.51	.56
D.C. Antifoam A*	lb.	4.85	5.95
Antifoam A Emulsion*	lb.	1.78	2.58
Antifoam AF Emulsion*	lb.	1.78	2.58
Antifoam B*	lb.	.59	1.06
Defoama W-1701*	lb.	——	.12½
Defoamer A-25*	lb.	——	3.00
Defoamer 630*	lb.	——	.14
Deltyl Prime	lb.	.70	.80
Foamnix*	lb.	.60	1.50
G-E Antifoam SS-24*; 66*	lb.	5.28	6.65
60 Emulsion*	lb.	2.05	3.75
Igepol CO-210	lb.	——	.36
Kessco X-3* (dms.)	lb.	——	.39
X-180*	lb.	——	.28
X-181*	lb.	——	.36½
Nopco 1407*	lb.	.20½	.22½
1497-V*	lb.	.15¼	.17¼
1907-B*	lb.	.22½	.25
JMK*	lb.	.48½	.51
JMU*	lb.	.23¼	.25¾
JMY*	lb.	.23¼	.23½
NDW*	lb.	.21½	.24
Pluronic L61*	lb.	.33½	.39
RS-968*	lb.	.38	.38½
Terpinol Prime No. 1	lb.	.35	.50
Tributyl Phosphate (dms.)	lb.	.52½	.53½
UC SAG 47*	lb.	4.85	6.25
470*	lb.	.61	1.10
VL-520*	lb.	2.68	3.50

ANTIOXIDANTS

Agebest 1293-22A*	lb.	1.90	2.00
AgeRite Alba*	lb.	2.40	2.50
DPPD*	lb.	1.12	1.14
Gel*	lb.	.70	.72
Hipar*	lb.	1.05	1.07
H.P.*	lb.	.79	.81
ISO*	lb.	1.82	1.84
Powder*	lb.	.57	.59
Resin*	lb.	.88	.90
Resin D*	lb.	.57	.59
Spar*	lb.	.57	.59
Stalite & Stalite S*	lb.	.57	.59
Superflex*	lb.	.57	.59
Superlite*	lb.	.57	.59
White*	lb.	1.50	1.60
Akroflex C* Pellets	lb.	.85	.87
CD*	lb.	.79	.81
Aminox*	lb.	.57	.59
Antioxidant 425*	lb.	2.47	2.50
Antioxidant 2246*	lb.	1.50	1.53
Antox*	lb.	.59	.61
Aranox*	lb.	——	3.25
Betanox Special*	lb.	.94	.96
B-L-E*	lb.	.57	.59
Catalin CAO No. 1*	lb.	.57	.60
CAO No. 3*	lb.	.65	.68
CAO No. 5*	lb.	1.49	1.50
CAO No. 6*	lb.	——	3.50
Dalpac 4	lb.	.57	.60
Deenax*	lb.	.57	.60
Diphenylamine	lb.	.31	.33
Di-tert-Butyl-para-Cresol*	lb.	.86	1.16
DBPC*	lb.	.54	.60
Eugenol C-95%*	lb.	2.30	2.50
Flectol H*	lb.	.57	.64
Flexamine*	lb.	.79	.81
Ionol*	lb.	.57	.60
Naugawhite*	lb.	.57	.59
Powder*	lb.	.57	.59
Neozone A*	lb.	.64	.66
C*	lb.	.86	.88
D*	lb.	.57	.59
Nevastain A*	lb.	.51	.61
B*	lb.	.51	.70
Nullapon BF-12*	lb.	——	.21½
BF-13*	lb.	——	.25½
BF-78*	lb.	——	.55
BF-Acid*	lb.	——	.85
Octamine*	lb.	.57	.59
Oxidex*	lb.	——	3.60
PDA-10*	lb.	.46	.48
Pennox* A, B, C, D	lb.	.57	.72
Permalux*	lb.	——	2.25
Polygard*	lb.	.57	.59
Santoflex AW*	lb.	.71	.78
DD*	lb.	.57	.64
75*	lb.	1.01	1.08
Santovar-A*	lb.	1.55	1.62
Santowhite Crystals*	lb.	1.55	1.62
Santowhite L*	lb.	.57	.64
MK*	lb.	1.25	1.32
Powder*	lb.	1.55	1.62
Sequestrene AA*	lb.	.70	.80
NA2*	lb.	.59	.66
NA3T*	lb.	.54	.61
Sodium Nitrate	cwt.	8.75	11.00
Stabilite*	lb.	.57	.59
Alba*	lb.	.75	.80
FLX*	lb.	.78	.80
L*	lb.	.65	.67
White*	lb.	.57	.59
White Powder*	lb.	.46	.48
Stabilizer No. 1*	lb.	1.55	1.80
Stabilizer No. 9-A*	lb.	.80	1.05
Styphen I*	lb.	.51	.55
Sunolite*	lb.	.16	.22
Tecquinol*	lb.	.82½	.84½
Tenamene 3*	lb.	.57	.60
Thermoflex A*	lb.	1.05	1.07
Wing-Stay S*; T*	lb.	.56	.67
Zalba*	lb.	——	1.10
Special*	lb.	——	.85

ANTIOZUNANTS

Eastozone*; 32*	lb.	1.15	1.18
Flexzone 3C	lb.	——	2.00
6-H	lb.	1.25	1.27
Fura-Tone NC-1008*	lb.	.28	.39
NC-1012*	lb.	.46	.69
Santoflex AW*	lb.	.71	.78
UOP 88* & 288* (dms)	lb.	.95	.97
Wing-Stay 100*	lb.	1.00	1.08

ANTI-SCORCHING AGENTS

Akron Benzoic Acid	lb.	.41	.43
Armeen HT*	lb.	.34	.40
Good-rite Vultrol*	lb.	.67	.70
Harcopel 1183*	lb.	.70	.74
Retarder PD*	lb.	.37	.39
W*	lb.	——	.46
Sodium Acetate 60-62% Crystals	lb.	.08	.08½

ANTISEPTICS AND GERMICIDES

A.P.C. 6901*	lb.	.32	.38
Arquad S*	lb.	.38	.44
Formaldehyde (dms.)	lb.	.06	.076
G-4* (bbls.)	lb.	1.09	1.29
G-11*	lb.	1.98	2.08
Halane*	lb.	.40	.47
Irgason BS200*	lb.	2.50	2.75
Ortho Cresol (26°—27°)	lb.	.15	.16
Preventol GD	lb.	——	1.09
Retarder D*	lb.	.42	.50

ANTI-WEBBING AGENTS (for Latex)

DC 7 Compound*	lb.	4.70	5.80
Webnix 34-L*	lb.	1.25	1.75
57*; 69C*	lb.	1.50	2.00
71*	lb.	1.25	1.75

AROMATICS (DEODORANTS)

Airkem 115*	gal.	——	6.50
122*; 186*	gal.	——	6.50
Alamask AA*	lb.	——	3.00
AF*	lb.	——	2.50
AO*	lb.	——	1.50
AR*	lb.	——	.50
BG*	lb.	——	1.15
BGM*	lb.	——	.60
CY*	lb.	——	2.40
DJ*	lb.	——	3.35
DL*	lb.	——	1.95
H*	lb.	——	5.50
LD*	lb.	——	.75
ND*	lb.	——	2.75
O*	lb.	——	6.50
OS*	lb.	——	5.25
Bouquet 149*	lb.	——	3.00
Coumarin*	lb.	——	3.70
Deodorant 65*	lb.	——	1.85
Deodorant L-37*	lb.	2.15	2.25
L-44*	lb.	2.65	2.75
N.L.T.X.*	lb.	1.90	2.00
Deodorant Oil GD 6422*	lb.	1.90	2.20
GD 6423*	lb.	1.60	1.90
GD 6575*	lb.	2.40	2.90
GD 31063*	lb.	2.25	2.75
Ethavan*	lb.	6.20	6.25
Latex Perfume 17326	lb.	——	4.00
18301	lb.	——	3.00
22258	lb.	——	2.50
Naugaromes* (dms.)	lb.	.60	3.00
Neutroleum Delta*	lb.	——	2.25
Gamma*	lb.	——	3.25
Parador A*	lb.	1.80	2.10
C*	lb.	2.00	2.50
E*	lb.	.25	.40
GD 5280*	lb.	2.00	2.50
GD 53481*	lb.	1.70	2.00
Perfume Oil Bouquet Vanilla M*	lb.	1.60	1.70
Rodo No. 0*	lb.	4.00	4.50
No. 10*	lb.	5.00	5.50
Rubbarome* (dms.)	lb.	.60	3.80
Rubber Perfume 12*	lb.	——	4.35
Russian Leather 7*	lb.	——	4.35
Vanillin	lb.	2.75	2.80

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	——	9.00
Better Blend Soda* (c.l., bags)	cwt.	——	2.70
B-I-K	lb.	.20	.22
Blowing Agent No. 81105	lb.	.32	.35
Celogen*	lb.	——	1.95
AZ*	lb.	1.92	1.94
80	lb.	——	1.60
Diazo Amino Benzene	lb.	——	.73
Kempore R-125	lb.	——	1.92
Neo Fat 42-12*	lb.	.10¼	.12¼
Opex 40	lb.	——	.72
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	2.55
Unicel ND*	lb.	——	.72
S*	lb.	——	.20
Urea	lb.	.06	.07

BONDING AGENTS

Base 6986*	lb.	.27	.32
Braze*	gal.	6.00	9.00
Braze Cover Cement*	gal.	2.50	4.00
Chemlock 201, 203	gal.	5.00	7.50
220	gal.	8.95	12.00
EX-B501-4	gal.	6.20	9.40
EX-B150-1	gal.	8.15	11.00
607	gal.	15.00	24.00
EX-B579-1	lb.	19.40	26.00

BONDING AGENTS (Cont'd)

Durez 12987*	lb.	.47½	.49
EX-B501-4	gal.	6.20	4.90
EX-B150-1	gal.	8.15	11.00
EX-B579-1	gal.	19.40	26.40
Gen-Tac Latex*	lb.	.70	.75
Hylene M*	lb.	1.25	1.50
M-50*	lb.	.86	1.11
Penacolite B1A*	lb.	——	.95
R-2710*	lb.	——	.95
Pliobond 20*	gal.	2.91	4.23
30*	gal.	3.65	4.97
Rex Compounds*	gal.	1.30	1.90
Thixons*	gal.	2.95	9.80
Ty-Ply Q (BN & S)*	gal.	6.75	8.00
Tygobond 30*	gal.	4.10	5.40
40*	gal.	5.80	6.89
41*	gal.	8.65	9.85
45*	gal.	5.75	6.48
Vinculux	gal.	——	4.95

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	9.00	11.00
Glacial 99½% (dms.)	lb.	.12	.13
Calcium Nitrate, Tech. Flake	lb.	.07½	.09½
Hydroxyacetic Acid—70% (dms.)	lb.	——	.09½
Zinc Nitrate, Tech. Flake	lb.	——	.20

COLORING AGENTS

Black

Aquablak B*	lb.	.09½	.10½
M*	lb.	.10½	.11
S*	lb.	.11¼	.12¼
Black Shield 4*	lb.	.10	.10½
No. 6	lb.	.11	.11½
No. 17	lb.	.12½	.13
No. 19	lb.	.12	.12½
Carbon Black—See *Reinforcing Agents*			
Lampblack No. 10*	lb.	.06	.09
Mapico Black Iron Oxide* (50 lb. bags)	lb.	.14¾	.15
Pure Black Iron Oxide	lb.	.14¾	.15

Blue

Akron Masterbatches*	lb.	2.23	2.78
Toners*	lb.	2.30	6.35
Blue Powders	lb.	2.20	3.75
Cooke M.B. Blue* 426	lb.	2.20	3.75
Cyan Blue GT 55-3295	lb.	——	3.20
XR 55-3760	lb.	——	2.90
XR 55-3770	lb.	——	3.25
Disco Blues	lb.	2.20	3.45
Harmon Blue Toner B-4776	lb.	——	2.90
Monastral Rubber Blue CPL*	lb.	1.95	1.95
PCD, Dispersed*	lb.	——	2.55
Peacoline Blue*	lb.	——	3.85
Ramapo Blue*	lb.	2.75	3.00
Rubber Blue GD* (Disp.)	lb.	——	4.75
Rubber Blue X-1999*	lb.	——	1.90
Rubber Dispersed Blues	lb.	2.52	2.78
Solfast Blue*	lb.	1.60	3.25
Stan-Tone MBS*	lb.	2.20	2.92
GPE*	lb.	2.25	2.75
PEC*	lb.	1.95	2.10
Ultramarine	lb.	.14	.30
Vansul Blue M.B.*	lb.	1.00	2.70

Brown

Brown Iron Oxide	lb.	.15¾	.16
Mapico Brown* (50 lb. bags)	lb.	.15¾	.16
Stan-Tone GPE*	lb.	——	3.00
Vansul Brown M.B.* (Organic)	lb.	——	2.30

Green

Akron Masterbatches*	lb.	1.53	3.08
Toners*	lb.	1.50	4.35
Chromium Oxide	lb.	.44½	.45¼
Cooke M.B. Green* 413*	lb.	1.60	2.80
	lb.	——	2.80
Cyan Green 15-3100	lb.	——	3.35
Disco Greens	lb.	1.55	2.80
Green Powders	lb.	1.35	3.95
Harmon Green Toner G-5056	lb.	——	3.95
Hi-Fiz Fluorescent	lb.	1.60	2.60
Monastral Rubber Green GSD* (Dispersed)	lb.	——	2.80
GSL*	lb.	2.20	2.20
Permansa Green CP-1236*	lb.	——	1.45
Pigment Green B*	lb.	1.45	1.50
GL-652D*	lb.	.90	.95
Ramapo Green*	lb.	——	3.50
Rubber Dispersed Greens	lb.	1.23	3.08
Rubber Green FD* (Disp.)	lb.	——	2.05
Rubber Green X-1292*	lb.	——	1.75
Serene Green*	lb.	——	3.50
Solfast Green*	lb.	1.60	3.35
Stan-Tone MBS*	lb.	2.50	3.42
GPE*	lb.	1.50	1.70
PC*	lb.	2.20	2.25
Vansul Green M.B.*	lb.	1.50	2.75

Maroon

Akron Masterbatches*	lb.	3.53	4.38
Toners*	lb.	.98	5.60
Harmon Maroon Toner MV-6606	lb.	——	5.75
Pyrolux Maroon*	lb.	——	3.40
Vansul Maroon M.B.*	lb.	——	4.05

COLORING AGENTS (Cont'd)

Orange

Akron Masterbatches*	lb.	2.53	2.98
Toners*	lb.	2.97	4.30
Benzidene Orange	lb.	—	3.30
Cooke MB*	lb.	2.25	2.35
425*	lb.	—	2.25
Dianisidine Orange*	lb.	—	2.85
Disco Oranges	lb.	2.30	2.85
Harmon Diane Orange Toner Y-25	lb.	—	2.85
Pyrazolone Orange Toner YB-3	lb.	—	3.30
Hi-Fiz Fluorescent	lb.	1.40	2.40
Mercadium X-2667*	lb.	—	1.73
Molybdate Orange	lb.	—	.49
Oswego Orange X-2065*	lb.	—	3.30
Rubber Orange OD* (Disp.)	lb.	—	2.25
Stan-Tone Cadmium Dry*	lb.	1.85	4.28
Cadmium Paste*	lb.	2.43	2.85
GPE*	lb.	1.05	1.20
PC*	lb.	.75	.80
Vansul Orange M.B.*	lb.	2.30	2.65

Red

Akron Masterbatches*	lb.	1.30	3.68
Toners*	lb.	.98	5.60
Arcturus Reds*	lb.	—	1.35
Antimony Trisulfide	lb.	.72	.78
R.M.P. Sulfur Free*	lb.	—	.78
R.M.P. No. 3*	lb.	—	.72
Bonadur 20-6440	lb.	—	1.90
20-6540	lb.	—	2.00
Brilliant Toning Reds*	lb.	1.77	1.90
Cadmolith Red* (dms.)	lb.	1.94	2.87
Clarion 20-7150	lb.	—	1.35
Cooke M.B. Red*	lb.	1.05	3.25
410*	lb.	—	1.75
Disco Reds	lb.	1.05	3.25
Graphic Red* (dlvd.)	lb.	.98	1.03
Harmon Electra Red Toner	lb.	—	3.45
Lithol Rubine Toner R-6142	lb.	—	1.60
Pyrazolone Red Toner	lb.	—	1.40
Rincon Red Tones	lb.	—	1.90
Hi-Fiz Fluorescent	lb.	1.15	2.15
Kroma Reds*	lb.	.14¼	.14½
Lake Red C*	lb.	—	1.25
Mapico Reds* (50 lb. bags)	lb.	.14¼	.14½
Mercadium X-2668 Light*	lb.	—	1.80
X-2669 Medium Light*	lb.	—	1.88
X-2670 Medium*	lb.	—	1.95
X-2671 Dark*	lb.	—	2.03
Naphthol 20-7575	lb.	—	3.80
Oximony Red Iron Oxide	lb.	.14¼	.14½
Plasticone Red*	lb.	1.02	4.60
Polaris Red*	lb.	—	1.70
Recco Red Oxide*	lb.	.13½	.13¾
Red Iron Oxide, Light	lb.	.14¼	.14½
Red Powders	lb.	—	4.40
Rubber Dispersed Reds	lb.	1.47	3.58
Rubber Red PBD* (Disp.)	lb.	—	2.05
2BD, Dispersed*	lb.	—	2.00
2BL*	lb.	1.24	1.24
PBL*	lb.	1.24	1.24
Rubanox Reds*	lb.	1.47	1.60
Rubber Red CP-339* (dlvd.)	lb.	—	1.10
Rubber Red X-1148*	lb.	—	.98
Solfast Red*	lb.	1.47	1.80
Stan-Tone MBS*	lb.	1.00	3.75
GPE*	lb.	.70	3.05
PC*	lb.	1.10	1.45
Vansul Red M.B.*	lb.	1.00	3.35
Watchung Red*	lb.	1.90	1.90

Tan

Mapico Tan 15* (50 lb. bags)	lb.	.23¼	.23½
20* (50 lb. bags)	lb.	.23¼	.23½

White—Lithopone

Permolith*	lb.	.0825	.09125
Sunolith*	lb.	.0800	.0875

White—Titanium Pigments

Iceberg*	lb.	—	.0265
Icecap K*	lb.	—	.03¼
Horse Head Anatase Grades*	lb.	.25½	.26½
Rutile Grades*	lb.	.27½	.28½
Stan-Tone PC*	lb.	.55	.60
Ti-Cal*	lb.	.09	.09¾
R-22*, R-25*, R-27*, R-30*	lb.	.09¾	.09⅞
R-60*	lb.	.09¾	.10⅛
Ti-Pure*	lb.	.24½	.27½
Anatase Grades*	lb.	.25½	.26½
R-100*, R-500*	lb.	.27¼	.28½
Titanox A*—all grades (dlvd.)	lb.	.25½	.26½
C-50* (dlvd.)	lb.	.14¾	.14⅞
RA* (dlvd.)	lb.	.27½	.28½
RA-10* (dlvd.)	lb.	.27½	.28½
RA-NC* (dlvd.)	lb.	.27½	.28½
RC* (dlvd.)	lb.	.09¾	.10⅛
RC-HT* (dlvd.)	lb.	.09¾	.09⅞

COLORING AGENTS (Cont'd)

White—Titanium Pigments (Cont'd)

Unitane O-110*	lb.	.25½	.26½
O-220*	lb.	.25½	.26½
O-310*	lb.	.25½	.26½
OR-150*	lb.	.27½	.28½
OR-250*	lb.	.27½	.28½
OR-340*	lb.	.27½	.28½
OR-342*	lb.	.27½	.28½
OR-350*	lb.	.27½	.28½
OR-540*	lb.	.27½	.28½
OR-640*	lb.	.27½	.28½
Zopaque*	lb.	.24½	.25½
R*	lb.	.26½	.27½

White—Zinc Oxide (American Process)

AZODOX 44, 45	lb.	.1250	.1350
AZO-ZZZ 11*, 22*, 33*, 44* 55*	lb.	.1250	.1350
Eagle-Picher AAA*	lb.	.1450	.1550
Horse Head Special*	lb.	.1450	.1550
XX*	lb.	.1450	.1550
Protox 166*	lb.	.1450	.1550
167*	lb.	.1450	.1550
267* (pelleted)	lb.	.1450	.1550
St. Joe Black Label* 20, 20-21	lb.	.1450	.1550
Red Label* 30, 31	lb.	.1450	.1550
Green Label* 12, 46 (latex only)	lb.	.1450	.1550
Green Label* 42, 42-21, 42A-3, 43 Pelets	lb.	.1450	.1550

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1250	.1350
Florence Green Seal*	lb.	.1450	.1550
Red Seal*	lb.	.1450	.1550
White Seal*	lb.	.1475	.1575
Kadox 25*	lb.	.1350	.1450
15*, 17*, 72* & 515	lb.	.1300	.1400
Protox 168*	lb.	.1450	.1550
169*	lb.	.1450	.1550
268* (pelleted)	lb.	.1450	.1550
U.S.P. (cartons)	lb.	.1600	.1700
XX-78*	lb.	.1450	.1550

White—Zinc Sulfide

Cryptone ZS*	lb.	.2530	.2630
Lehigh 12%*	lb.	.1250	.1350
18%*	lb.	.1400	.1500
25%*	lb.	.15375	.16375
50%*	lb.	.1575	.1675

Yellow

Akron Masterbatch*	lb.	1.27	2.48
Toners*	lb.	2.20	6.00
Benzidene-Lightfast	lb.	3.40	5.35
Benzidine Yellow	lb.	1.41	2.55
Cadmolith Yellow (dms.)	lb.	—	1.19
Chrome Yellow	lb.	.35	.35
Cooke M.B. Yellow 405*	lb.	2.15	2.75
Disco Yellows	lb.	2.05	3.95
Harmon Benzidene Yellow Toner YB-2	lb.	—	2.25
Fanchon Yellow Toner	lb.	—	2.20
Hi-Fiz Fluorescent	lb.	1.60	2.60
Iron Oxide, Pure Light Shades	lb.	.12½	.12¾
Dark Shades	lb.	.12	.12¼
Mapico Yellow* (50 lb. bags)	lb.	.12	.12¼
Rubber Dispersed Yellows	lb.	1.27	2.13
Rubber Yellow GD* (disp.)	lb.	—	2.25
GL*	lb.	—	1.68
Rubber Yellow X-1940*	lb.	—	2.55
Stan-Tone Cadmium Dry*	lb.	2.80	3.03
Cadmium Paste	lb.	1.72	1.82
MBS*	lb.	1.30	2.20
GPE*	lb.	.79	3.25
PC*	lb.	.55	3.50
Toluidine Yellow	lb.	2.20	2.20
YL-660 D*	lb.	1.25	1.35
Oximony Iron Oxide	lb.	.14¼	.14½
Vansul Yellow M.B.*	lb.	1.15	2.15
Yellow Powders	lb.	2.00	5.00
Zinc Yellow	lb.	.29	.29

DISPERSING AGENTS

Anchoid*(†)	lb.	.24	.25
Anhydrapent*	lb.	.56	.59
Armeen 18*	lb.	.30	.45
Belloid TD*	lb.	.15¾	.16¼
Blancol*	lb.	—	.15¾
Darvan No. 1*	lb.	.25¼	.38¼
No. 2*; No. 3*	lb.	.23¾	.36¾
No. 6*	lb.	.18½	.19
No. 7*	lb.	.26¼	.36¼
Daxad 11* (21*, 23*)	lb.	.08	.30
Diethanolamine (dms., dlvd.)	lb.	.24½	.27
Dispersaid*	lb.	1.25	1.35
Emcol K-8300* (dms.)	lb.	.14	.18
P10-59	lb.	.32	—
5120	lb.	.31	—
5138	lb.	.31	—
Emulphor ON-870*	lb.	—	.55
Furala*	lb.	.06½	.07½
Halloid*	lb.	.04½	.05½
Igepal CO-630*	lb.	—	.29
Igepon T-73*	lb.	—	.29½
Kyro EO* (dms.)	lb.	—	.29¾
Leonil SA*	lb.	—	.55

DISPERSING AGENTS (Cont'd)

Lipal No. 9N*; 11-O*	lb.	.28	.29
Lomar PW*	lb.	.15¼	.15¾
Marasperse C*	lb.	.06¼	.06¾
CB*	lb.	.15	.17
N*	lb.	.09½	.10½
Monoethanolamine (dms., dlvd.)	lb.	.25	.27½
Naccosol A (dlvd.)	lb.	—	.52
Naccotan A*	lb.	.16½	.17
Nekal BA-75*	lb.	—	.40
BX-78*	lb.	—	.64
Nopcosant*	lb.	.15¼	.15¾
Pluronic F68*	lb.	.38½	.44
Polyfon*	lb.	.08	.10
R & R 551*	lb.	—	.28
Stablex B*	lb.	.50	.95
Stan-Chem BQC*	lb.	.12¼	.17¾
1067*	lb.	—	.13½
1471*	lb.	.1687	.2187
2251*	lb.	.12¼	.17¾
Trenamine D-25*	lb.	.32½	.36
Triethanolamine (dms., dlvd.)	lb.	.22	.25½
Yelkin TT* (and TTS*)	lb.	.13	.16

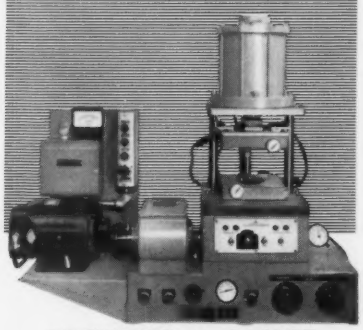
EXTENDERS

Arcco 1294-36B*	lb.	.11½	.12½
Car-Bel-Ex-A*	lb.	—	.144
Extender 600*	lb.	—	.1870
Facile Gum 4A*	lb.	.48	.50
Millex*; W*	lb.	—	.07
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
Polyco 418*	lb.	.17	.18
PR-162 Latex Extender*	lb.	—	.182
Solvitose HDF*	lb.	.22	.25
Synprolac*	lb.	.16	.23
Synprowax*	lb.	—	.23
Vanadiset B*	lb.	.0360	.07
C*	lb.	.0310	.06
MR* 80 mesh	lb.	.08½	.12½
Vistanex MM Grades*	lb.	.35	.37½
Wilcarbo Carbon Powders*	lb.	.08	.15

FILLERS (Inert and Reinforcing)

Abrasives Carbonite*	lb.	.21½	1.35
Lionite*	lb.	.16	1.27
Pumice	lb.	.03	.05
Walnut Shell Grits	ton	60.00	110.00
Aluminum Hydrate	lb.	.031	.170
Kaiser Aluminum Hydrate*	lb.	.035	.065
Aluminum Silicate AFD*	ton	29.50	36.00
Aluminum Flake*	ton	29.50	36.00
Marter White*	ton	18.50	30.00
Barium Carbonate (l.c.l.)	ton	109.00	126.50
Barytes No. 1 Floated, White*	ton	55.00	79.85
No. 2 Floated, Unbleached*	ton	50.00	74.85
No. 22 Barytes* (c.l.)	ton	—	30.00
No. 3805 Barytes*	ton	22.00	26.75
Foam A*	ton	60.00	84.85
Sparmite*	ton	80.00	90.00
XIOR*	ton	90.00	95.00
Bentonite (c.l.)	ton	—	13.50
Argosite Clay* (c.l.)	ton	—	12.50
Bennett Clay* (c.l.)	ton	—	32.50
SPV Volclay* (c.l.)	ton	—	13.50
White Hi-Gel*	ton	—	65.90
Blanc Fixe	ton	125.00	142.00
Calcium Carbonate Allied Whiting	ton	—	11.50
Atomite* (c.l.)	ton	32.50	35.00
B.I. White No. 1 (c.l. ton		—	10.00
Calcene NC*	ton	80.00	100.00
TM*	ton	82.50	102.50
Calwhite*	ton	20.00	25.00
T*	ton	25.00	30.00
Camel-Carb*	ton	—	14.00
Camel-Tex*	ton	—	22.00
Camel-Wite*	ton	—	35.00
Carbium	ton	30.00	40.00
CCC "G"*	ton	15.00	17.00
CCC No. 1*	ton	10.50	12.50
CCO White*	ton	—	22.00
Duramite*	ton	20.00	22.00
Gamaco* (c.l.)	ton	32.50	37.50
T*	ton	37.50	42.50
GamaKal*	ton	37.50	42.50
Georgia Marble 5-25* (c.l.)	ton	—	20.00
No. 10 White* (c.l.)	ton	—	11.00
Kalite*	ton	52.50	67.50
Kalmac*	ton	23.00	28.00
Laminar*	ton	—	30.00
Lesamite* (c.l.)	ton	—	27.50
Lorite*	ton	30.00	36.00
Millical*	ton	38.00	53.00
Multifex MM*	ton	117.50	137.50
Non-Fer-Al*	ton	35.00	50.00
Purecal M*	ton	65.00	85.00
SC* (and T*)	ton	117.50	137.50
U*	ton	127.50	147.50
PPTD* (c.l.)	ton	—	30.00
Rambo No. 1*	ton	—	11.50
Snowflake*	ton	20.00	22.00
Super Multifex*	ton	167.50	187.50
Surfex*	ton	42.00	57.00
Suspenso*	ton	38.00	43.00
Witcarb Reg.*	ton	60.00	85.00
R*	ton	127.50	150.00
RC*	ton	117.50	140.00
York White*	ton	—	11.50

VARIABLE SPEED MOONEY VISCOMETER



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Precise Temperature Control within ±½°F at any set temperature to 400°F is another important feature of the Scott Model STI. Designed and constructed for fast, easy calibration, effortless operation, and a modicum of maintenance . . . the new Variable Speed Viscometer may also employ Scott's new *dual-pen* recorder which simultaneously records viscosity in Mooney units and temperature of test specimen in °F, on *one* chart.

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A

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Beneath the beat, beat, beat of the tom-toms lurks the haunting suspicion there must be a far better way to communicate about such a gossamer intangible as *editorial quality*.

It's great. We have it. But what is it?

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FILLERS (Cont'd)

Calcium Silicate			
Silene EF*	lb.	.06	.06½
Calcium Sulfate, Anhydrous			
Snow White Filler*	ton	—	22.00
Calcium Sulfate Hydrous			
Terra Alba No. 1*	ton	—	17.00
Chalk Whiting (l.c.l.)	lb.	.01½	.01¾
Recco Paris Whiting*	ton	—	35.00
OMYA Whiting*	ton	—	35.00
Clay			
Afton Clay*	ton	13.00	38.00
Aiken Clay*	ton	14.50	—
Akron HC-100*	ton	14.50	—
HC-75*	ton	13.00	—
SC-25*	ton	14.50	—
Alsilite* (c.l.)	ton	30.00	45.00
Aluminum Flake*	ton	25.50	28.50
Barden R*	ton	7.50	12.00
Buca* (c.l.)	ton	—	45.00
Burgess No. 20*	ton	—	33.00
No. 30*	ton	—	40.00
Burgess Iceberg*	ton	—	53.00
Icecap K*	ton	—	65.00
Catalpo* (c.l.)	ton	33.00	—
Champion*	ton	—	14.50
Crown*	ton	—	14.50
Dixie* (c.l.)	ton	—	14.50
Dover*	ton	—	13.00
Franklin Clay—R* (c.l.)	ton	16.00	41.50
G. K. Soft*	ton	11.50	32.00
Glomax HE (bags)	ton	65.00	—
LL (bags)	ton	53.00	—
PVR (bags)	ton	40.00	—
WZ (bags)	ton	45.00	—
Harwick Clays*	ton	21.50	77.00
Hydrite RS (bags)	ton	30.00	—
PXS (bags)	ton	45.00	—
UF (bags)	ton	100.00	—
10S (bags)	ton	50.00	—
Flat "D" (bags)	ton	25.00	—
Hi-White R*	ton	10.00	14.50
Kaolloid Clay* (c.l.)	ton	—	10.50
LGB*	ton	13.00	17.50
LGP*	ton	15.50	20.00
McNamee* (c.l.)	ton	—	14.50
Natka 1200	ton	12.00	35.00
Par* (c.l.)	ton	—	12.00
Paragon*	ton	10.00	14.50
Pigment 5*	ton	27.50	34.50
33*	ton	—	40.00
Polyfil 40	ton	40.00	—
70	ton	53.00	—
80	ton	65.00	—
C	ton	25.00	—
F	ton	45.00	—
X	ton	30.00	—
Recco* (c.l.)	ton	—	14.50
Swanee Clay*	ton	—	12.50
Snobrite*	ton	—	12.50
Suprex*	ton	10.00	14.50
Whitetex* (c.l.)	ton	53.00	—
Windsor*	ton	14.50	39.50
4200 Clay*	ton	13.00	—
Diatomaceous Earth	ton	30.00	50.00
Celatom MN-33	ton	36.00	95.00
MP-25	ton	55.00	121.00
MP-63	ton	55.00	121.00
Celite 270	ton	55.00	121.00
292	ton	36.00	95.00
315; 350	ton	137.00	225.00
Kaylorite* (c.l.)	ton	—	30.00
Lorite*	ton	—	36.00
Flock			
Cotton (White)	lb.	.28	.30
Colored	lb.	.12	.20
Filfloc F 40-9000*	lb.	—	.13
F 6000*	lb.	—	.36
Nylon	lb.	—	.35
Polycel*	ton	110.00	210.00
Rayon, Bleached or Dyed	lb.	.75	1.20
Rayon, Grey	lb.	—	.18
Rayon, Pink	lb.	—	.20
Solka-Floc* (l.c.l.)	lb.	.07	.16
Glue, Amber	lb.	.17	.19
Ground Softwood Bark			
Silvacon* (c.l.)	ton	55.00	100.00
Leather			
Flour (dust)	lb.	.12	.15
Shredded	lb.	.03	.17
Lignin	lb.	.06	.08
Limestone, Pulverized	ton	3.00	5.00
Asbestol Regular*	ton	28.00	—
Asbestol Superfine*	ton	33.00	—
Georgia Marble No. 10*	ton	—	11.00
Industrial Filler No. 100*	ton	—	7.75
Micro Velva A*	ton	53.00	—
L*	ton	61.00	—
No. 1 White*	ton	—	11.00
Magnesium Carbonate	lb.	.10½	.13
Magcarb L*	lb.	.11	.13
Michigan*	lb.	.11	.15
Magnesium Silicate (see Talc)			
Mica	lb.	.01¼	.07¾
Concord*	lb.	.08	.08¾
Micro-Mica*	lb.	.08	.08¾
Mineralite* (c.l.)	ton	40.00	85.00
Silversheen*	lb.	.08	.08¾
Triple A Mica* (c.l.)	ton	—	40.00
Vermiculite*	lb.	—	.11
Wet Ground Biotite Mica	lb.	.06½	.07¼
Wet Ground Mica No. 160*	lb.	.08	.08¾

FILLERS (Cont'd)

Pecan Shell Flour			
Stan Shell*	ton	45.00	75.00
Pyrophyllite			
No. 261*	ton	—	11.50
Pyrax A* (c.l.)	ton	14.50	15.00
WA* (c.l.)	ton	17.00	17.50
Sawdust, Graded	ton	14.00	35.00
Silica	ton	16.00	27.00
Extra Fine (bags) (c.l.)	ton	—	43.00
Slate, Powdered (l.c.l.)	ton	15.00	20.00
Lo-Micron Slate Flour*	lb.	—	.04½
No. 133 Slate Flour*	ton	—	4.55
Sodium Silico Aluminate			
Zeolex 23*	lb.	.06	.07
Talc (Magnesium Silicate)			
Akron Soapstone*	ton	—	9.75
Asbestol Regular*	ton	—	27.00
Eastern RC-500*	ton	—	32.00
No. 41*	ton	—	19.70
No. 549*	ton	—	63.00
French*	ton	—	59.00
No. 367*	ton	—	13.00
No. 1600*	ton	—	70.60
No. 1768*	ton	—	13.00
Nytal 200* (c.l.)	ton	—	28.00
300* (c.l.)	ton	—	38.00
Sierra Fibrene C-400*	ton	34.00	40.00
Sierra Supreme 325*	ton	51.00	56.00
Sierra White*	ton	21.75	26.75
Soapstone*	ton	—	13.00
Walnut Shell Flour	ton	55.00	100.00
Agrashell*	ton	55.00	115.00
Stan-Shell*	ton	50.00	110.00
Whiting, Commercial	ton	—	7.50
Allied Whiting*	ton	—	11.50
Camel-Carb*	ton	—	10.00
Calwhite (c.l.)	ton	—	20.00
C-C-O White*	ton	—	22.00
Georgia Marble No. 15*	ton	—	20.00
No. 16*	ton	—	20.00
Piqua No. 1 YAA* (c.l.)	ton	10.00	10.00
No. 2 LS* (c.l.)	ton	10.00	10.00
Snowflake* (c.l.)	ton	20.00	22.00
Stan-White 325*	ton	11.50	14.10
Ultrasil*	lb.	.35	.50
Veroc* (c.l.)	ton	—	11.50
Welco* (c.l.)	ton	—	10.50
York White R* (c.l)	ton	—	11.00
Wood Flour	ton	31.50	48.00

FINISHING MATERIALS, SURFACE

Beaco Finishes*	gal.	2.10	2.35
Black Out*	gal.	4.50	8.00
Calcium Hypochlorite (dms.) (cwt.)	ton	33.30	37.90
Shellac, Orange Gum	lb.	.35	.45
VanWax*	gal.	2.00	2.05

FLAME RETARDANTS

Cellufiex CEF* (dms.)	lb.	—	.65
Chlorowax 40*	lb.	.15	.17½
50*	lb.	.16	.18½
70*	lb.	.18½	.20
Halowax*	lb.	.36	.46
Zinc Borate 3167*	lb.	.1920	.2020
Zyrox Compounds*	lb.	.38	.95½

LATEX MODIFIERS

Crux*	lb.	.30	.65
Foamnix*	lb.	.60	1.50
Ludox	lb.	.15	.16¾
Nopco EB*	lb.	.16¾	.18¾
EB-1*	lb.	.16¾	.18¾
EB-5*	lb.	.19½	.21½
OPD-101*	lb.	.29	.40
Piccopale A-1 Emulsion	lb.	.086	.113
A-20	lb.	.089	.116
A-22	lb.	.097	.124
A-41; A-43	lb.	.0775	.0145
C-1	lb.	.091	.118
N-3	lb.	.100	.127
STAYB*	lb.	.25	.45
Syton 200	lb.	.15	.16¼
Ubatol U-2001* (t.c.)	lb.	.166	.187
U-2003* (t.c.)	lb.	.184	.208
U-2007* (t.c.)	lb.	.166	.187
U-3025* (c.l.)	lb.	.223	.235
U-3040* (c.l.)	lb.	.260	.272
U-3045* (c.l.)	lb.	.260	.272
U-3050* (c.l.)	lb.	.195	.207
Webnix*	lb.	1.25	2.00

LUBRICANTS, MOLD

Akro Gel*	lb.	—	.165
Alipal CO-433*	lb.	—	.20
CO-436*	lb.	—	.24
Aluminum Stearate Crown Brand*	lb.	.37	.42
Amine, Mixed Crude*	lb.	.19	.25
Aquadag*	lb.	3.50	4.00
Aquarex D*	lb.	—	.81
L*	lb.	—	.94
ME*	lb.	—	.82
MDL*	lb.	—	.33
WAQ*	lb.	—	.22
Armeen HT*	lb.	.34	.40
180*	lb.	.52	.56
Armid HT (flaked)*	lb.	.42	.46
0*	lb.	.39	.41
Borax Granular (l.c.l.)	ton	89.00	94.00

LUBRICANTS, MOLD (Cont'd)

Carbowax 4000*	lb.	.31	.32
CD Mold Release B*	gal.	5.00	—
B-2*	gal.	5.00	—
Colite Concentrate* (dms.)	gal.	.90	1.15
Colite D43D*	gal.	1.15	1.40
Concentrex*	lb.	—	.25
Dag Dispersion No. 197*	lb.	1.95	2.90
D.C. 7 Compound*	lb.	4.70	5.80
D.C. Emulsion No. 7*	lb.	1.59	2.07
No. 8*	lb.	1.15	1.69
No. 35*; 35A*	lb.	1.15	1.69
No. 35B*	lb.	1.15	1.69
No. 36*	lb.	1.15	1.69
D.C. Mold Release Fluid*	lb.	2.90	3.47
Dri-Lube*	lb.	—	.22
Dry-Flo* (50 lb. bags)	lb.	21.40	—
Emulsion Lubricant A80*	lb.	—	1.20
45*	lb.	—	1.20
G-E Silicone Emulsion			
SM-55*	lb.	1.15	1.69
SM-61*	lb.	1.15	1.69
SM-62*	lb.	1.15	1.69
G-E Silicone Fluid SF-92*	lb.	2.90	4.05
SF-96*	lb.	2.90	4.05
Hawkeye Flake* (dlvd.)	lb.	.11½	.13¼
Igepal CO-430*	lb.	—	.29
CO-630*	lb.	—	.29
CO-530*	lb.	—	.29
Igepon AP-78*	lb.	—	.48
T-33*	lb.	—	.21
T-51*	lb.	—	.13½
Kokobace R*	lb.	.17½	.18½
Lipal 9-N*	lb.	.28	.29
7-O*	lb.	.29	.30
Lubrex	lb.	.25	.30
Lubri-Flo*	gal.	10.00	12.00
Migralube*	lb.	—	.35
ML-1027-2C*	gal.	—	2.65
ML-1029-2C*	gal.	—	2.65
Mold Lubricant No. 72 Conc.* (dms.)	gal.	—	1.90
Mold Lubricant No. 426* (dms.)	lb.	.18	.17
No. 735* (dms)	gal.	—	1.25
No. 769* (dms.)	gal.	—	1.20
No. 825* (dms.)	gal.	—	2.00
No. 856* (dms.)	gal.	—	1.90
No. 880* (dms.)	gal.	—	1.19
No. 887* (dms.)	gal.	—	1.80
No. 935* (dms.)	gal.	—	1.56
No. 956* (dms.)	gal.	—	2.50
No. 965* (dms.)	gal.	—	2.15
No. 967* (dms.)	gal.	—	2.40
No. 969* (dms.)	gal.	—	1.50
No. 970* (dms.)	gal.	—	4.50
No. 975* (dms.)	gal.	—	2.85
No. 980* (dms.)	gal.	—	1.53
No. 987* (dms.)	gal.	—	2.45
A 187* (dms.)	gal.	—	1.90
A 256* (dms.)	gal.	—	1.20
A 988* (dms.)	gal.	—	2.60
Moldeze No. 3*	gal.	—	4.95
Mold-Brite*	gal.	—	1.50
Monopole Oil MD*	lb.	—	.16
MR-22 Silicone Semi-Permanent	gal.	9.95	14.95
Olate Flakes*	lb.	.23½	.24¼
Orvus WA Paste* (dms.)	lb.	—	.23¼
Plaskon Polyethylene S*	lb.	.32	.47
Poly-Brite PE-20	lb.	.28	.42
600	lb.	.42	.58
Poly-Cone 125X	lb.	1.15	1.30
1,000	lb.	.91	1.04
Polyglycol 15-200*	lb.	.25	.28¼
E4000*	lb.	.31	.37
Prodag*	lb.	.32	.60
Purity Flake* (dlvd.)	lb.	.14¾	.16½
Rubber-Flo*	gal.	1.25	2.00
Rubber-Glo*	gal.	—	.94
Rusco Mold Paste*	lb.	.25½	.32
Sericite* (l.c.l.)	ton	65.00	75.00
Silicone Oil A145*	lb.	3.22	3.61
A220* (dms.)	lb.	—	2.80
Silrex (dms.)	lb.	—	.65
Rubars*	lb.	—	.22¼
Soybean Lecithin	lb.	.13	.17
Thermalube*	lb.	—	.13¼
UC Silicone L-45*	lb.	2.90	4.61
L-522*	lb.	2.68	3.50
LE-45*	lb.	1.15	1.69
LE-450*	lb.	1.15	1.69
Ucon Lubricants*	lb.	.26¼	.27¼
Ulco Mold Soap*	lb.	.19	.29

LUBRICANTS, RUBBER

Cyclolube NN-1; NN-2;			
NN-3	gal.	.12½	.20½
NN-4	gal.	.13½	.21½
114	gal.	.19	.27
4053	gal.	.21	.29
Diglycol Stearate Neutral (and SE) (dms.)	lb.	—	.25
Extrud-o-Lube*	gal.	1.33	1.54
Ivory Chips*	lb.	.19¾	.20¾
LatexLube GR* (dlvd)	lb.	.19¼	.21½
No. 82-A* (450 lb. dms.)	lb.	—	.08½
Nopcowax 22-DS*	lb.	.38½	.41
Propylene Stearate (dms.)	lb.	.35	.60
Versa-Lube B*	lb.	.16	.18

LUBRICANTS, RUBBER SURFACE

Antidust	lb.	.37	.41
Barium Stearate	lb.	.41	.46
Calcium Stearate	lb.	.39	.44
Crown Brand*	lb.	.37	.42
D.C. 7 Compound*	lb.	4.70	5.80
D.C. 200 Fluid*	lb.	2.90	3.47
ELA*	lb.	—	.82
G-E Silicone Fluid SF-92*	lb.	3.04	4.25
Glycerized Lubricant*	gal.	1.25	1.48
Glydag B*	lb.	1.60	2.25
Glyso-Lube* (dms.)	lb.	—	.14
No. 3* (dms.)	lb.	—	.14
Hydro-Zinc*	lb.	—	.20
Latex-Lube Pigmented* (dlvd.)	lb.	.17¼	.19¼
R-66*	lb.	—	.17½
Liqui-Lube* (dlvd.)	lb.	—	.17¾
N.F.* (dlvd.)	lb.	—	.17¾
N.T.* (dlvd.)	lb.	—	.16¾
Lubrex*	lb.	.27	.32
Lubri-Cote	gal.	.86	1.00
Magnesium Stearate	lb.	.42	.47
Crown Brand*	lb.	.40	.45
Polyethylene Glycol	lb.	.22	.26
Rexanol*	lb.	—	.13
Rubber Free (Concentrate)*	gal.	—	1.44
Jel*	lb.	.18	.21½
Separex*	lb.	.08½	.10½
Slab-Dip* (dms.)	lb.	—	.17
Soybean Lecithin	lb.	.13	.17
Stock-Lube*	lb.	—	.19
UC L-45*	lb.	2.90	4.61
L-522*	lb.	2.68	3.50
LE-450*	lb.	1.15	1.69
XL-42*	lb.	3.10	4.75
XLE-42*	lb.	1.22	1.70
XLE-420*	lb.	1.18	1.70
Wet Zinc*	lb.	—	.22¼
CW*, P*	lb.	—	.20
Zinc Stearate	lb.	.41	.46

MOLD CLEANERS

Actusol* (dlvd.)	gal.	1.45	1.65
Alkon* (dlvd.)	lb.	.16	.16½
CA-301*	gal.	—	2.49
CA-302*	gal.	—	2.63
G-O 6910*	lb.	.38	.40
Metso Anhydrous*	cwt.	5.70	7.95
Metso 99*	cwt.	5.00	7.25
200*	cwt.	6.70	8.95
Granular*	cwt.	4.45	6.70
Orvus Extra Granules*	lb.	.23¼	.24¼
Polo*	lb.	.12¾	—
Rubber-Sol*	gal.	2.97	3.97
Shelblast*	lb.	.04	.08¼
Sprex A.C.* (dlvd.)	lb.	.17¾	.18¾
Zip Mold Cleaner*	gal.	1.05	1.55

PEPTIZING AGENTS

Peptizer P-12*	lb.	.95	1.35
Pepton 22 Plasticizer*	lb.	.83	.86
65*	lb.	1.23	1.26
65B*	lb.	.83	.86
Pitt-Consol 640 (dms.)	lb.	—	.42
646 (dms.)	lb.	—	.52
RPA 2*	lb.	—	.85
3*	lb.	—	.51
3 Conc.*	lb.	—	.85
6*	lb.	—	1.66

PLASTICIZERS & SOFTENERS

Actisil	lb.	.26	.27
Acto 500*	lb.	—	.00
Adipol BCA*	lb.	.47	.47½
2EH*	lb.	.38½	.40
10A*	lb.	.38½	.40
ODY*	lb.	.38½	.40
810*	lb.	.42½	.45½
XX*	lb.	.38½	.40
Admex 562 (dms.)	lb.	.50¾	.51¾
710 (dms.)	lb.	.35¾	.36¼
711 (dms.)	lb.	.37¾	.38¼
744 & 745 (dms.)	lb.	.41¾	.42¼
760 (dms.)	lb.	.59¾	.60¼
761 (dms.)	lb.	.46¾	.47¼
770 (dms.)	lb.	.42¼	.43
Anhydrol 6990*	lb.	.51	.56
Arneel SD*	lb.	.34	.40
Arolene 1980* (c.l.)	lb.	—	.10
Aromatic Plasticizer 10* (and 25*) (dms.)	lb.	.08	.08½
Aromatic Tar	gal.	.0573	.1973
Bardol*	lb.	.02¾	.03¾
B*	lb.	.06¼	.06½
Bavol D*	gal.	—	.382
F*	gal.	—	.52
Bearflex 1751*	lb.	.14	.15
LPO*	lb.	.03	.04
MPO*	lb.	.03¼	.04¾
Beeswax, Bleached	lb.	.73	.75
Yellow Refined	lb.	.64	.65
Bondogen*	lb.	.55½	.60½
B.R.C. No. 20*	lb.	.0150	.0175
No. 21*	lb.	.02¼	.03
No. 22*	lb.	.02½	.02¾
B.R.H. 2*	lb.	.0213	.0351
BRS 700*	lb.	.0200	.0285
B.R.T. 3*	lb.	.0180	.0265
4*	lb.	.0250	.0260
7*	lb.	.0300	.0310

PLASTICIZERS & SOFTENERS (Cont'd)

B.R.V.*	lb.	.0475	.0565
Bunarex Resins*	lb.	.07	.08
Bunatak AH*	lb.	—	.09½
N*	lb.	—	.31
U*	lb.	—	.17½
No. 90*	lb.	—	.09
No. 210*	lb.	—	.14
Butac*	lb.	.1735	.1835
Butyl Carbitol Perlargonate (dms.)	lb.	—	.64½
Butyl Cellosolve Perlargonate (dms.)	lb.	—	.68
Butyl Oleate	lb.	.26	.27
Butyl Palmitate	lb.	—	.26½
Butyl Stearate (dms.)	lb.	.26	.27
Byerflux*	gal.	.28½	.29½
Califlux 510* (and 550*)	lb.	.02¾	.03¾
G.P.*	lb.	.01½	.02½
R-100*	lb.	.04¾	.05¾
LBL*	gal.	.17	.25
OSR*	lb.	.01½	—
RC*	gal.	.13½	.21½
TT*	lb.	.0195	.0295
Candelilla Wax, Prime	lb.	.53	.64
Refined Light	lb.	.56	.60
Carbowax 4000* (dms.)	lb.	.68	.70
Cardolite NC-103*	lb.	.36	.59
Carnauba Wax, Crude	lb.	.73	.74
Flaked	lb.	.73	1.25
Refined, Technical	lb.	.73	.74
Refined, Pure	lb.	.82	.86
Yellow	lb.	1.10	1.15
Celluflex* (dms.)			
112* (t.c., dlvd.)	lb.	—	.32½
179-A* (t.c., dlvd.)	lb.	—	.32½
179-C* (t.c., dlvd.)	lb.	—	.32½
179-EG* (t.c., dlvd.)	lb.	—	.32½
DBP* (t.c., dlvd.)	lb.	—	.30
DOP* (t.c., dlvd.)	lb.	—	.28½
TPP* (dms., eqld.)	lb.	—	.40
Ceresin Wax	lb.	.12	.30
Chlorowax 40*	lb.	.15	.17½
50*	lb.	.16	.18½
70*	lb.	.18½	.20
LV*	lb.	.17	.19½
CTLA Polymer*	gal.	.20	.36
Cumar Resins*	lb.	.07	.19
Cyclolube OSR*	gal.	.28	.36
Darex DBM*	lb.	.30½	.34
DBP*	lb.	.30	.33½
DOP*	lb.	.30½	.33½
DIOP*	lb.	.30½	.33½
D.B.M.*	lb.	.32	.34¾
Decylbutyl Phthalate	lb.	.27	.29½
Degras, Common	lb.	—	.14
Diallyl Phthalate	lb.	.51½	.52½
Dibenzyl Sebacate (dms.)	lb.	.93	.93½
Dibutoxyethyl Sebacate	lb.	—	.61½
Dibutyl Phthalate (dms.)	lb.	.31½	.33
Dibutyl Sebacate	lb.	.67½	.68
Dicapryl Adipate (dms.)	lb.	.41½	.42½
Dicapryl Phthalate (dms.)	lb.	.27½	.29
Dicapryl Sebacate	lb.	.58	.59½
Di-Carbitol Phthalate (dms.)	lb.	.50½	.51
Dicyclohexyl Phthalate	lb.	.45	.46½
Diethyl Phthalate (dms.)	lb.	.29¾	.31¼
Di-2-ethylhexyl Phthalate (dms.)	lb.	.29	.30½
Dihexyl Adipate (dms.)	lb.	.46½	.47½
Dihexyl Phthalate (dms.)	lb.	.32½	.33½
Dihexyl Sebacate (dms.)	lb.	.66	.66½
Diisobutyl Azelate	lb.	—	.47¾
Diisobutyl Phthalate	lb.	.30	.31½
Di-iso-octyl Adipate	lb.	.42½	.43½
Dimethyl Phthalate (dms.)	lb.	.29¾	.31¼
Dimethyl Sebacate (dms.)	lb.	1.30	1.30½
Dinonyl Adipate	lb.	.44¼	.47½
Dinopol IDO*	lb.	.27½	.29
MOP*	lb.	.28½	.30
Dioctyl Adipate (dms.)	lb.	.42½	.43½
Dioctyl Phthalate (dms.)	lb.	.27	.28½
Dioctyl Sebacate (dms.)	lb.	.61¼	.62¼
D.I.O.P. (dms.)	lb.	.28½	.30
Dipolymer Oil	gal.	.33	.48
Dispersing Oil No. 10*	lb.	.06	.06¼
Dutrex* 1, 6, 7	gal.	.18	.23
6H	gal.	.13	—
15E	gal.	.11	.23
20, 25	lb.	.03	.06
33	gal.	.21	.33
DX-111	lb.	.13¼	.14¼
DX-111 NS	lb.	.14¼	.15¼
DX-40	lb.	.14¾	.15¾
Elastex 10-P*	lb.	.30½	.33½
50-B*	lb.	.25	.28
DCHP*	lb.	.59	.60
Emulphor EL-719*	lb.	—	.58
Epoxy Plasticizer	lb.	.33½	.36
Drapex 3.2*	lb.	.39¼	.40¼
Drapex 4.4*	lb.	.34¾	.35¾
Drapex 7.7*	lb.	.37	.38
Esparto Wax	lb.	—	.55
Estar*	lb.	—	.16
Facile Gum 4A*	lb.	.48	.50
Flexol B-400*	lb.	.29	.30
DOP*	lb.	.29	.30½
TOF*	lb.	.47	.48
3GH*	lb.	—	.46¾
3GO*	lb.	—	.55¾
4GO*	lb.	—	.36½
426*	lb.	.28½	.30
Flexricin P-1*	lb.	.33½	.36½
P-4*	lb.	.30½	.33¾
P-6*	lb.	.37	.40
P-8*	lb.	.30¼	.33¼

PLASTICIZERS & SOFTENERS (Cont'd)

Fortex A* (dms.)	lb.	.12½	.14½
Fura-Tone NC-1008*	lb.	.28	.39
Galex W-100*	lb.	.15½	.19¼
Good-rite GP233*	lb.	.40	.43½
GP235*; GP236*	lb.	.40	.43½
GP261*	lb.	.28	.31½
GP265*	lb.	.28½	.32
GP266*	lb.	.29	.32½
GP-266-BPA*	lb.	.29	.32½
Hallco C-255-NS*	gal.	.27½	.29½
C-566*	lb.	.11	.13
Harflex 300* (dms.)	lb.	.60½	.61
325* (dms.)	lb.	.45	.45½
330* (dms.)	lb.	.46¼	.46¾
375* (dms.)	lb.	.76	.76½
HB20*	lb.	.17	.18½
HB40*	lb.	.21½	.23
Herron-H.T.*	gal.	.16	.27
Herron-Plas*	lb.	—	.03¾
Herron-Wax*	lb.	.05¼	.06
No. 23*	lb.	.08¼	.08¾
No. 24*	lb.	.07¼	.07¾
HSC No. 13*	lb.	.25	.32
No. 39*	lb.	.22	.29
Indonex W-2*	gal.	.12	—
Isooctyl Decyl Phthalate (dms.)	lb.	.28	.29½
K-stay*	lb.	.12	.13
Kapsol*	lb.	.35	.35½
Kenflex A & N*	lb.	.19	.34
Kesscoflex BCL* (dms.)	lb.	—	.37
BCO* (dms.)	lb.	—	.33
BCP* (dms.)	lb.	—	.36
BCS* (dms.)	lb.	—	.32
BO* (dms.)	lb.	—	.28¼
BS* (dms.)	lb.	—	.27½
DBT* (dms.)	lb.	—	.68
DIOA* (dms.)	lb.	—	.43½
DOA* (dms.)	lb.	—	.43½
MCO* (dms.)	lb.	—	.35½
MCP* (dms.)	lb.	—	.41
MCS* (dms.)	lb.	—	.35
TRA* (dms.)	lb	—	.40
KP 20*	lb.	.27	.28½
23*	lb.	.32½	.33½
90*	lb.	.42½	.44
140*	lb.	.48	.48½
201*	lb.	.46½	.48
260*	lb.	.35½	.37
Kremol 40*	gal.	.36	.46
50*	gal.	.39	.49
Kronisol* (dms.)	lb.	.38	.39
Kronitex AA* (dms.)	lb.	.35	.36
I, K-3, MX*	lb.	.35	.36
Lanolin, Tech. Anhydrous	lb.	—	.26
Latex-Lube G.R.*	lb.	.19¼	.20
Lead Oleate	lb.	—	.29¾
Lindol* (dms., t.c.)	lb.	—	.32½
Locusol No. 1-6980*	lb.	.30	.34
2-Mercaptoethanol (dms.)	lb.	1.25	1.50
Methox*	lb.	.42	.43
Methyl Laurate	lb.	.25	.27
Methyl Oleate	lb.	—	.20
Methyl Stearate (dms.)	lb.	—	.30
Monoplex DOS*	lb.	.59½	.60½
DBS*	lb.	.65½	.66½
S-70*	lb.	.41	.42
S-71*	lb.	.46½	.47½
Montan Wax, Crude	lb.	.21	.26
Flaked	lb.	.29	.29
Morflex*	lb.	.32	.69¼
Natac*	lb.	.1685	.1785
Nebony Resins* (dms.)	lb.	.04½	.05½
Neolene 210* (t.c.)	lb.	—	.16
212* (t.c.)	lb.	—	.14
220* (t.c.)	lb.	—	.15
Nerium*	lb.	—	.09
Nevillac Resins* (dms.)	lb.	.31	.85
Neville LX-880* (dms.)	lb.	.12	.13½
LX-685* (dms.)	lb.	.12	.17½
LX-782 (dms.)	lb.	.07½	.08½
LX-828* (dms.)	lb.	.11	.12½
LX-1000* (dms.)	lb.	.12	.13
Neville Resins* (dms.)	lb.	.07¼	.20
Nevindene Resins* (dms.)	lb.	.16½	.20
Nevinol* (dms.)	lb.	—	.24
No. 480 Oil Proof Resin*	lb.	—	.18
Ohopex Q10* (dms.)	lb.	.28½	.30
R9* (dms.)	lb.	.37¼	.37¾
OPD*	lb.	.29	.40
Ortho-Nitrobiphenyl	lb.	.13	.15
Ozokerite Wax, White and Yellow	lb.	.24	.31
Panaflex BN-1*	lb.	.18	.22¼
Panarez 3-210	lb.	.12½	.14
6-210	lb.	.12	.13½
12-210	lb.	.11½	.13
Paradene Resins (dms.)	lb.	.07¼	.08
No. 2 Flaked	lb.	.08	.08½
Para Flux* (dms.)	gal.	.22	.25
2016* (dms.)	gal.	.22	.26
Para Lube* (t.c.l.)	lb.	.046	.048
Paraplex G-25*	lb.	.76	.77
G-40*	lb.	.50	.51
G-50*	lb.	.40¾	.41¾
G-53*	lb.	.45	.46
G-60* (and G-61*)	lb.	.32¼	.32¾
G-62*	lb.	.33¾	.33¾
Parmo*	lb.	.06	.13¼
Peroxidol 780*	lb.	.33¼	.36¼
781*	lb.	.34¾	.37¾
Petroflux MV*	gal.	.097	.177
Petrolatum (dms.)	lb.	.04¼	.14½

PLASTICIZERS & SOFTENERS (Cont'd)

PG-16*	lb.	——	.35
Philrich-5* (t.c.)	gal.	——	.12½
Picco 10* (and 25*)	lb.	.15	.15½
60* (and 75*)	lb.	.14½	.15
100*	lb.	.14½	.17
Piccocizer 30*	lb.	.06½	.07
Piccolastic A* (B*, C*, D* & E*)	lb.	.24	.25
FT* (FHX* & FX*)	lb.	.1695	.1745
T-135*	lb.	.19	.20
Piccolyte S Resins*	lb.	.20½	.23½
Piccopale Resins*	lb.	.1200	.1360
Piccoumaron Resins*	lb.	.07	.18
Pigmentar* Pigmentaroil*	lb.	.510	.684
Pitt-Consol 500* (dms.)	lb.	.30	.30½
Plastac M*	lb.	——	.09¼
Plasticil	lb.	.10½	.11¾
NS	lb.	.11½	.12¾
Plasticizer 2286*	lb.	——	.26¼
Plasticizer 4141*	lb.	.42½	.43½
Plasticizer DP-200, DP-250, DP-520*	lb.	.45	.45¾
DP-316*	lb.	.32¾	.33½
DP-317*	lb.	.46	.47¼
DP-8732*	lb.	.44¼	.46
Plasticizer LP*	lb.	——	.07
Plasticizer MP*	lb.	——	.08
Plasticizer MT-511*	lb.	——	.69¼
Plasticizer OLN*	lb.	.36	.42
Plasticizer SC*	lb.	.42	.46
Plasticizer W-13*	lb.	.37	.38¾
Plastoflex 3*	lb.	——	.52
52*	lb.	.37¾	.38¾
VS*	lb.	.41¾	.42¾
Plastogen*	lb.	.08¾	.09
Plastolein 9050* (c.l.)	lb.	.54½	.56½
9055*	lb.	.30½	.32½
9058*	lb.	.48	.50
9250*	lb.	.38¾	.40¾
9715*	lb.	.39	.40
Plastone	lb.	.23	.27
Polycizer 162*	lb.	.27½	.29
332*	lb.	.42½	.44
562*	lb.	.28	.29½
662*	lb.	.28½	.30
532 and 632*	lb.	.42½	.44
ED*	lb.	——	.45
Polyco 438*	lb.	.34	.35
Polymel C-130*	lb.	.13¾	.14¾
D*	lb.	.22½	.23½
6*	lb.	.05¾	.07¾
Poly-Sperse AP-2	lb.	.23	.29½
AP-300, LC-20	lb.	.26	.32½
Poly-Sperse R-100	lb.	.17	.23½
Process Oil C-255* (c.l.)	gal.	.27½	.29½
Propylene Stearate (dms.)	lb.	——	.32
FRR 1*	gal.	.15	.35
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0440	.0630
400 Pine Tar* (600* & 800*) (t.c., dms.)	lb.	.0440	.0630
PX-5	lb.	.21½	.22½
PX-7	lb.	.24	.25
PX-104* (dms.)	lb.	.31½	.33
PX-108* (dms.)	lb.	.27	.28½
PX-138* (dms.)	lb.	.27	.28½
PX-208* & 238* (dms.)	lb.	.38½	.39½
PX-404* (dms.)	lb.	.67½	.68½
PX-438* (dms.)	lb.	.59	.60
PX-800* (dms.)	lb.	.35¼	.36¾
PX-917* (dms.)	lb.	.35	.36
RC Plasticizer B-17* (dms.)	lb.	.23½	.24½
O-16* (dms.)	lb.	.30	.31
TG-8*&TG-9* (dms.)	lb.	.34½	.35½
TG-85* (dms.)	lb.	.36½	.37½
RC Polymeric BGA* (dms.)	lb.	.45½	.46½
Reogen*	lb.	.14¼	.14½
Resin C*	lb.	.0225	.0310
731D	lb.	.17⅛	.18¾
Resinex*	lb.	.03¾	.05½
L-4*	lb.	.02¼	.04¼
Rexflex*	lb.	——	.15
Rosin Oil	gal.	.80	1.35
RR-10 (Neoprene)*	lb.	——	.37
R.S.O. Softening Oil*	lb.	.03	.05
RuBars*	lb.	.19¼	.20
Rubberol*	lb.	.18	.25¾
SP Resins	lb.	.2900	.4775
Santicizer B-16*	lb.	.46¾	.47¾
E-15*	lb.	.53	.54
M-17*	lb.	.44	.45
No. 140*	lb.	.35	.36
No. 141*	lb.	.36½	.37½
No. 160*	lb.	.27½	.29
No. 602*	lb.	——	.28½
No. 603*	lb.	.27	——
Sherolatum*	lb.	.03½	.06
Staflex DBES*	lb.	.58½	.61½
DOS*	lb.	.59¼	.62¼
IXA*	lb.	.32	.35
KA*	lb.	.34	.36¾
Stan Chlor Oils*	lb.	.13½	.20½
70*	lb.	.17½	.30
Stanolind Petrolatum*	lb.	.07	.156
Wax*	lb.	.31	.33
Staybelite Resin	lb.	.13¾	.15
Sunny South Burgundy Pitch*	lb.	.123	.1285
Rosin Oil*	gal.	.605	.76
Superla Wax*	lb.	.30	.397
Syncera Wax*	lb.	.16	.267
Syn Tac* (c.l.)	gal.	——	.33
Synthetic Revertant Oil	lb.	——	16
Tarpine	lb.	.035	.050

PLASTICIZERS & SOFTENERS (Cont'd)

Terpene A*	gal.	——	.65
Tetraflex R-122*	lb.	.27	.30½
TP-90B*	lb.	.59	.69
TP-95*	lb.	.65	.75
Transphalt Resins*	lb.	.03¾	.05¼
Tributyl Phosphate	lb.	.52½	.53½
Tricresyl Phosphate	lb.	.35	.36
Triphenyl Phosphate	lb.	.41½	.43½
Turgum S*	lb.	.1560	.1660
Turgum SB*	lb.	.10½	.11½
Turpol NC-1200*	lb.	.67	.70
NC-1300*	lb.	——	.50
Vistac No. 1*	gal.	1.00	1.21
P*	lb.	.18	.18½
Vopcolene 50*	lb.	——	.31
Witcizer 100*	lb.	.26	.27
200*	lb.	.22¼	.25¼
300*	lb.	.30	.33½
312*, 313*	lb.	.28	.31½
412*	lb.	.42½	.46

PROCESSING AIDS

Castor Oil, Blown (dms.)	lb.	.25½	.26½
Refined (dms.)	lb.	——	.18½
Castorwax*	lb.	.25	.31
Dutrex 7*	lb.	.12	.20
ELA*	lb.	——	.82
Foamnix*	lb.	.60	1.50
Hydrofol Glycerides 200*	lb.	.15½	.19¾
Kenflex N*	lb.	.19	.26
Maleic Anhydride	lb.	——	.27
Millrex*	lb.	——	.15
Nadic Anhydride	lb.	——	.75
Polycin*	lb.	——	.24½
R-B-H Resin 510*	lb.	.19	.26
530*	lb.	.25	.32
STAYB*	lb.	.25	.45
Thiomalic Acid	lb.	——	3.50
Webnix*	lb.	1.25	2.00
Zyrox*	lb.	.78	.88

PROTECTIVE & STABILIZING AGENTS

Acacia*	lb.	.12¼	.21
Alcogum*	lb.	.08½	.24
Alpha Protein	lb.	——	.23
Aroostoocrat*	lb.	——	.07½
Carob Bean Flour	lb.	——	.50
Casein	lb.	.22	.35
Emcol K-8300* (dms.)	lb.	.14	.18
Ethylene Diamine 68%	lb.	.44	.47
Gum Arabic	lb.	——	.23
Karaya Gum	lb.	——	.35
Locust Bean Gum	lb.	——	.50
Modicol VD*	lb.	.13⅜	.15⅞
Prosein*	lb.	——	.06
Stablex B*	lb.	.50	.95
E*	lb.	.27	.35

RECLAIMING AGENTS

Amalgamator Z-4*	lb.	.34	.35
Armeen C*	lb.	.46	.52
Mixed Crude*	lb.	.19	.25
T*	lb.	.32	.38
Blend No. 27 Oil	gal.	.35	.42
Burco RA*	lb.	.051	.081
BWH-1*	gal.	.16	.17
C-6 Oil* (28* & 32*)	gal.	.33	.38
C-10 Oil*	gal.	.25	.30
C-33* (t.c.)	gal.	——	.21½
C-42* (t.c.)	gal.	——	.23
Caustic Soda—Flake 76% (c.l., dms.)	cwt.	——	5.20
Liquid 50% (t.c.)	cwt.	——	2.90
Solid 76% (c.l., dms.)	cwt.	——	4.80
Cresylic Acid (99-100%)	gal.	.85	1.39
D-4* (t.c.)	gal.	——	.27
E-5* (t.c.)	gal.	——	.25
Flake Calcium Chloride (77-80%)	ton	——	31.00
(94-97%)	ton	——	39.80
Gensol No. 6* (t.c.)	gal.	——	.42
Heavy Aromatic Naphtha	gal.	.13¼	.18½
LX-572 Reclaiming Oil*	gal.	.27	.32
LX-777 Reclaiming Oil*	gal.	.23	.33
Neo-Fat D-242*	lb.	.05½	.07¾
42-70*	lb.	.08¼	.10¼
No. 517 H.B. Oil*	gal.	.11½	.16½
535*	gal.	.22	.27
Nucom* (t.c.)	gal.	——	.42
Pitt-Consol 500 (dms.)	lb.	.25	.25½
500 NS* (dms.)	lb.	.33	.33½
640 (dms.)	lb.	.42	.42
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0440	.0630
Q Oil* (t.c.)	gal.	——	.286
Reclaiming Oil 3186-G*	gal.	.26	.33
Reclaiming Reagent No. 1431*	lb.	.21	.25
R.P.A. No. 3*	lb.	——	.51
RR-10*	lb.	——	.37
Soda Ash (c.l., bags)	cwt.	——	1.85
Solvenol No. 1	gal.	.50	.67
No. 2	gal.	.41	.62
Solvent 534*	gal.	.20½	.26½
Solvent Oil 21*	gal.	.24	.29
C-42*	gal.	.23	.38
701 Oil*	gal.	.27	.29

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Channel, Medium Processing (MPC) (bags)

Arrow MPC*	lb.	.0850	.1625
Continental A*	lb.	.0850	.1625
Kosmobile HM (and S-66)	lb.	.0850	.1625
Micronex Standard*	lb.	.0850	.1625
Spheron 6*	lb.	.0850	.1625
Texas M*	lb.	.0850	.1625
Witco No. 1*	lb.	.0850	.1625

Channel, Easy Processing (EPC) (bags)

Collocarb*	lb.	.0710	.1485
Continental AA*	lb.	.0850	.1625
Kosmobile 77*	lb.	.0850	.1625
Micronex W-6*	lb.	.0850	.1625
Spheron 9*	lb.	.0850	.1625
Texas E*	lb.	.0850	.1625
Witco No. 12*	lb.	.0850	.1625
Wyex EPC*	lb.	.0850	.1625

Channel, Conductive (CC) (bags)

Continental R-40*	lb.	.2600	.3500
Dixie 5 Dustless*	lb.	.1400	.2250
Kosmos-Dixie BB*	lb.	.2600	.3500
Texas MC-74-BD*	lb.	.2600	.3500
Voltex*	lb.	.2600	.3500

Conductive Furnace Black (CF) (bags)

Aromex CF*	lb.	.0875	.1550
Continex CF*	lb.	.1100	.1700
Kosmos CF*	lb.	.0925	.1600
Shawinigan Acetylene Black*	lb.	——	.1900
Vulcan C*	lb.	.1100	.1850

Extra-Conductive Furnace Black (ECF) (bags)

Vulcan XC-72 (pellets)*	lb.	.2500	.3400

Furnace, Fast Extruding (FEF) (bags)

Arovel FEF*	lb.	.0675	.1350
Continex FEF*	lb.	.0675	.1350
Dixie 50*	lb.	.0675	.1350
Kosmos 50*	lb.	.0675	.1350
Philblack A*	lb.	.0675	.1350
Statex M*	lb.	.0675	.1350
Sterling SO*	lb.	.0675	.1350

Furnace, Fine (FF) (bags)

Statex B*	lb.	.0725	.1400
Sterling 99*	lb.	.0725	.1400

Furnace, General Purpose (GPF) (bags)

Arogen GPF*	lb.	.0600	.1275
Continex GPF*	lb.	.0600	.1275
Dixie 35*	lb.	.0600	.1275
Kosmos 35*	lb.	.0600	.1275
Statex G*	lb.	.0600	.1275
Sterling V*	lb.	.0600	.1275
V (Non-Staining)	lb.	.0600	.1275

Furnace, High Abrasion (HAF) (bags)

Aromex HAF*	lb.	.0775	.1450
Continex HAF*	lb.	.0775	.1450
Dixie 60*	lb.	.0775	.1450
Kosmos 60*	lb.	.0775	.1450
Philblack O*	lb.	.0775	.1450
Statex R*	lb.	.0775	.1450
Vulcan 3*	lb.	.0775	.1450

Furnace, High Modulus (HMF) (bags)

Continex HMF*	lb.	.0625	.1300
Dixie 40*	lb.	.0625	.1300
Kosmos 40*	lb.	.0625	.1300
Modulex HMF*	lb.	.0625	.1300
Statex 93*	lb.	.0625	.1300
Sterling L* and LL*	lb.	.0625	.1300

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF*	lb.	.0575	.1250
Dixie 20*	lb.	.0575	.1250
Essex SRF*	lb.	.0575	.1250
Furnex*	lb.	.0575	.1250
Gastex*	lb.	.0625	.1350
Kosmos 20*	lb.	.0575	.1250
Pelletex* and NS*	lb.	.0575	.1250
Regal*	lb.	.0575	.1250
Shawinigan Acetylene Black*	lb.	——	.1900
Sterling NS* and S*	lb.	.0575	.1250
R*	lb.	.0625	.1350

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace Super Abrasion (SAF) (bags)

Aromax SAF	lb.	.1150 -	.1825
Dixie 85	lb.	.1150 -	.1900
Kosmos 85	lb.	.1150 -	.1900
Philblack E*	lb.	.1150 -	.1900
Statex 160*	lb.	.1150 -	.1900
Vulcan 9*	lb.	.1150 -	.1900

Furnace, Super Abrasion, Intermediate (ISAF) (bags)

Aromex ISAF*	lb.	.0925 -	.1600
Continex ISAF*	lb.	.0925 -	.1600
Dixie 70*	lb.	.0925 -	.1600
Kosmos 70*	lb.	.0925 -	.1600
Philblack I*	lb.	.0925 -	.1600
Statex 125*	lb.	.0925 -	.1600
Vulcan 6*	lb.	.0925 -	.1600

Furnace, Super Conductive (SCF) (bags)

Conductex SC*	lb.	.1150 -	.1800
Vulcan SC*	lb.	.1800 -	.2550

Thermal, Fine (FT) (bags)

P-33 (c.l.)*	lb.	—	.0625
Sterling FT (c.l.)	lb.	—	.0625

Thermal, Medium (MT) (bags)

Shellblack*(†)	lb.	—	.0250
Sterling MT (c.l.)	lb.	—	.0450
MT Non-Staining (c.l.)*	lb.	—	.0550
Thermax (c.l.)*	lb.	—	.0450
Stainless (c.l.)	lb.	—	.0550

Specialty Blacks (Awaiting Classification)

Neotex 100*	lb.	.0775 -	.1450
Neotex 130*	lb.	.0925 -	.1600
Neotex 150*	lb.	.1150 -	.1900
Regal 300*	lb.	.0775 -	.1450
Regal 600*	lb.	.0925 -	.1600

REINFORCING AGENTS—SILICA

Cab-o-sil*	lb.	.66 -	1.25
D. C. Silica (pelletized)*	lb.	1.45 -	1.65
Hi-Sil 233*	lb.	.08¼ -	.09¾
X303*	lb.	.50 -	.60
Santocel*	lb.	.62 -	.64
Ultrasil VN-3*	lb.	.35 -	.65
Valron Estersil*	lb.	2.00 -	2.25

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac*	lb.	.40 -	.50
Cato 2* (100 lb. bag)	lb.	17.00 -	—
Darex Copolymer No. 3*	lb.	.47 -	.49
43G*	lb.	.39 -	.41
Darex Copolymer Latex No. 3-L	lb.	.41½ -	.46
Durez 12687 (and 12707)*	lb.	.36½ -	.40
Durez 13355*	lb.	.27½ -	.31½
Dymerex Resin	lb.	.15¾ -	.17
Good-rite Resin 2007*	lb.	.36 -	.38
2057*	lb.	.30 -	.31
Hystron*	lb.	.39 -	.41
Kralac A-EP*	lb.	.39 -	.41
Lampblack	lb.	— -	.12
Marbon 8000*	lb.	.36 -	.43
Marmix*	lb.	.35 -	.43
Mistron Vapor*	lb.	— -	.03½
HGO-55*	lb.	— -	.05
Pliolite Latex 150*	lb.	.35 -	.39
Pliolite Resin-Rubber Masterbatches*	lb.	.33 -	.57
Pliolite NR*	lb.	.93 -	.95
S6B*	lb.	.36 -	.43
Polyco 220*	lb.	.18¼ -	.19¼
Poly-Phen 201-C; 218-C	lb.	.27½ -	.29
202-C	lb.	.36 -	.37½
Polypol S-70*	lb.	.25 -	.26

RETARDERS

Akron Benzoic Acid TBAO-2*	lb.	.41 -	.43
Dutch Boy Normasal*	lb.	— -	.46
ESEN*	lb.	.39 -	.41
Good-rite Vultrol*	lb.	.67 -	.70
Harcopol 1183*	lb.	.70 -	.74
Retarder J*	lb.	.68 -	.70
PD*	lb.	.39 -	.41
W*	lb.	— -	.46
Retardex*	lb.	.46 -	.46
TCM-25*	lb.	.60 -	.70
Wiltrol P	lb.	.37 -	.39

RUBBER SUBSTITUTES

Mineral Rubber

Byerlyte*	ton	55.00 -	62.00
Hard Hydrocarbon Solid (dms.)	lb.	.03 -	.06
Granular (bags)	lb.	.03¼ -	.06¼
Herron Flake*	ton	— -	45.00
Mineral Rubber, Solid	ton	42.50 -	44.50
M. R. No. 38*	ton	57.00 -	70.00

RUBBER SUBSTITUTES (Cont'd)

Vulcanized Vegetable Oils

Amberex*	lb.	.29 -	.36
Brown	lb.	.15 -	.24
Car-Bel-Lite*	lb.	.33½ -	.36
Neophax*	lb.	.17 -	.27
Car-Bel-Rex A and C*	lb.	— -	.126
White	lb.	.15 -	.26
670 Brown	lb.	.14¼ -	.14¾

Miscellaneous Rubber Substitutes

Gilsowax B*	lb.	.09 -	.11
Kessn No. 1098 (dms.)	lb.	— -	.62
No. 1198*	lb.	.46¾ -	.49¾
Tysonite*	lb.	.30 -	.30¾

SOLVENTS

Acetone (dlvd.)	lb.	.09½ -	.11
Amaco Lactol Spirits* (t.c.)	gal.	— -	.20
Naphthol Spirits*	gal.	— -	.19
Mineral Spirits*	gal.	— -	.18
Rubber Solvent* (t.c.)	gal.	— -	.19
Solv A* (t.c.)	gal.	— -	.22
Solv A-80* (t.c.)	gal.	— -	.23½
Solv B* (t.c)	gal.	— -	.28
Solv B-90* (t.c.)	gal.	— -	.31
Solv D* (t.c.)	gal.	— -	.30
Solv E*	gal.	— -	.30
Solv F*	gal.	— -	.30
Solv F-80*	gal.	— -	.32
Solv G*	gal.	— -	.36
Special Naphtholite* (t.c.)	gal.	— -	.19
Special Textile Spirits*	gal.	— -	.20
Super Hi-Flash Naphtha*	gal.	— -	.34
Super Naphtholite*	gal.	— -	.19
Textile Spirits* (t.c.)	gal.	— -	.20
Amyl Chlorides, Mixed (t.c.l.) (dms.)	lb.	— -	.11
Benzol 90%	gal.	.36 -	.40
Butyl Acetate	lb.	.17 -	.18½
Butyl Alcohol	lb.	.17 -	.19½
Secondary (dlvd.)	lb.	.15 -	.16½
Tertiary (dlvd.)	lb.	.15 -	.16½
Carbon Bisulfide, Tech.	lb.	.07 -	.08½
Carbon Tetrachloride	lb.	.10¾ -	.14¾
Cesol 1*	gal.	.37 -	.43
2*	gal.	.42 -	.48
Cyclohexane	gal.	.77 -	110.00
85% (c.l.) (dms.)	gal.	— -	.56
Cyclohexanone	lb.	.31 -	.34½
Diacetone, Pure (dlvd.)	lb.	.15½ -	.17
Dichlorethyl Ether (dms.)	lb.	.15½ -	.16½
Dichloropentanes (l.c.l.) (dms.)	lb.	— -	.06
Dicom*	gal.	— -	.55
Halowax Oil*	lb.	.28 -	.41
Heptanes* (t.c.)	gal.	— -	.1609
Hexanes (t.c.)	gal.	— -	.1584
Isobutyl Acetate	lb.	.15¼ -	.16¾
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.62 -	.72
Ether, Ref. (dlvd.)	lb.	.09½ -	.11
Mersol*	gal.	.43 -	.79
Mesityl Oxide (dlvd.)	lb.	.15 -	.16½
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.66 -	.72
Methyl Chloride	lb.	— -	.12¾
Methyl Ethyl Ketone	lb.	.15 -	.16½
Methyl Isobutyl Ketone (dlvd.)	lb.	.17 -	.18½
Methylene Chloride	lb.	— -	.12½
N-5 Pentane Mix* (t.c.)	gal.	— -	.13½
N-6 Hexanes* (t.c.)	gal.	— -	.14½
N-7 Hexanes* (t.c.)	gal.	— -	.13½
Nelio Dipentene	gal.	.41 -	.62
Penetrell*	gal.	.41 -	.42
Perchloretylene	lb.	.11¾ -	.15¼
Petrolene* (t.c.)	gal.	— -	.14125
Picolines, Alpha, Refined	lb.	.43½ -	.44
Mixed	lb.	.32½ -	.33
Proprietary Solvent (dms.)	gal.	.66 -	.77
Propyl Acetate (t.c., dlvd.)	lb.	— -	.11¾
Alcohol (t.c., dlvd.)	lb.	— -	.11
Pyridine, Refined	lb.	.69½ -	.70
Quinoline	lb.	.50¾ -	.51¼
Rubber Solvent (t.c.)	gal.	— -	.16
Rubsol (t.c.)	gal.	— -	.12875
Skellysolve B (Hexanes)* (t.c.)	gal.	— -	.16
C (Heptanes)* (t.c.)	gal.	— -	.16¼
R (Rubber Solvent)*	gal.	— -	.1390
Solvent, Crude, Light	gal.	.19 -	.28
Solvesso 100* (t.c.)	gal.	.33 -	.35
150 (t.c.)	gal.	.33 -	—
Sunny South DD Dipentine*	gal.	.41 -	.62
Sunny South DD Pine Oil*	lb.	— -	.15
Sunray*	gal.	.1140 -	.1600
Toluene (dms.)	gal.	— -	.38
Toluol (t.c.)	gal.	.25 -	.25
Trichlorethane	lb.	— -	.12¾
Trichlorethylene	lb.	.12 -	.16¾
Triglycol Dichloride	lb.	.63 -	.64
Union Thinner 1* (t.c.)	gal.	— -	.174
5* (dms.)	gal.	— -	.199
7* (t.c.)	gal.	— -	.164
2-50 W Hi-Flash*	gal.	— -	.41
Xylol (t.c.)	gal.	.29 -	.30

STABILIZING AGENTS (for Vinyl Resins)

Advastab BC-12*	lb.	.90 -	.93
BC-74*	lb.	.70 -	.75
BC-105*	lb.	.75 -	.80
CH-101*; CH-201*	lb.	.60 -	.65
E-82*	lb.	.90 -	.95
JCX*	lb.	.62 -	.67
L Paste*	lb.	.65 -	.70
SN*	lb.	.47 -	.52
T-10*	lb.	1.90 -	1.95
T-50-LT*	lb.	3.20 -	3.25
XBZ-155*	lb.	.69 -	.74
XC-143*	lb.	.90 -	.95
XE-98*	lb.	.53 -	.58
Amioca 50* 85* (bags)	lb.	11.11 -	11.26
Barca 10*	lb.	.65 -	.70
Barium Stearate	lb.	.41 -	.46
Basic Silicate White Lead.	lb.	.16½ -	.17½
Cadmium Ricinoleate	lb.	— -	2.00
Calcium Ricinoleate	lb.	— -	.55
Dutch Boy DS-207*	lb.	— -	.54
B*	lb.	— -	.32½
Tribase*	lb.	— -	.27½
Dythal*	lb.	— -	.39½
Ferro 182* (dms.)	lb.	.70 -	.76
200* (dms.)	lb.	1.33 -	1.43
203* (dms.)	lb.	.87 -	.91
541* (dms.)	lb.	.35½ -	.45½
541A* (dms.)	lb.	.82 -	.86
700* (dms.)	lb.	.48¾ -	.58¾
900* (dms.)	lb.	.90 -	.94
903* (dms.)	lb.	.60 -	.64
909* (dms.)	lb.	.91 -	.95
920*	lb.	— -	.98
931* (dms.)	lb.	.75¾ -	.85¾
993* (dms.)	lb.	.89 -	.99
1203* (dms.)	lb.	1.30 -	1.40
1206* (dms.)	lb.	1.32 -	1.36
1820* (dms.)	lb.	.90 -	.94
1825* (dms.)	lb.	1.00 -	1.04
1976*	lb.	.47 -	.51
Harshaw 1-V-3*	lb.	.43 -	.45
1-V-4*	lb.	.68 -	.70
1-V-7*	lb.	.70 -	.72
2-V-4*	lb.	.85 -	.87
2-V-8*	lb.	1.31 -	1.33
5-V-1*	lb.	.41 -	.43
6-V-1B*	lb.	— -	.55
6-V-2*	lb.	.62 -	.72
6-V-6*	lb.	.62 -	.72
6-V-10*	lb.	.62 -	.72
7-V-2*	lb.	1.00 -	1.10
8-V-1*	lb.	.89 -	.99
8-V-100*	lb.	.89 -	.99
9-V-1*	lb.	.77 -	.87
12-V-5*	lb.	.73 -	.75
24-V-1*	lb.	1.10 -	1.12
128-V-5*	lb.	.86 -	.88
Istabelan No. 115 Liquid	lb.	.85 -	.95
No. 120 Liquid	lb.	.65 -	.75
Kosol* (50 lb. bags)	lb.	19.00 -	—
Lithium Stearate	lb.	.52 -	.57
Fluffy	lb.	.47½ -	.70
Standard	lb.	.52½ -	.75
Mark A*	lb.	2.80 -	3.15
C*	lb.	.81 -	.84
E*	lb.	.72 -	.75
GS*	lb.	.77 -	.80
LL*	lb.	.59 -	.62
KCB*	lb.	.59 -	.62
M*	lb.	.59 -	.62
PL*	lb.	.62 -	.65
TT*	lb.	.72 -	.75
WS*	lb.	.97 -	1.00
X*	lb.	2.50 -	2.75
XI*	lb.	.87 -	.90
XV*	lb.	.84 -	.87
XX*	lb.	.57 -	.60
33*; 34*; 35*	lb.	.97 -	1.00
Metasap 613-A*	lb.	— -	.69
613-B*	lb.	— -	.84
613-C*	lb.	— -	1.06
621*	lb.	— -	.88
624*	lb.	— -	.75
633*	lb.	— -	.75
635*	lb.	— -	.45
Modicol N*	lb.	.42½ -	.44½
S*	lb.	.30⅞ -	.32⅞
Nonisol 100	lb.	.38 -	.43
Sodium Silicates 41°/1:3.2	cwt.	1.20 -	2.30
Stabilizer No. 52*	lb.	1.90 -	2.00
89X*	lb.	.75 -	.80
B-5*	lb.	— -	.70
E6B*	lb.	— -	.95
G-1*	lb.	1.25 -	1.40
HR*	lb.	.85 -	.89
L*	lb.	— -	.60
OM-10*	lb.	— -	1.95
Staflex OY*	lb.	1.00 -	1.20
QXMA*	lb.	— -	.70
Stayrite 10*	lb.	.36 -	.41
P-10*	lb.	.43 -	.45
15*	lb.	.55 -	.57
20*	lb.	.41 -	.46
22*	lb.	1.00 -	1.13
25*	lb.	.35 -	.40
70*	lb.	.70 -	.72
71*	lb.	.90 -	.92
75*	lb.	.61 -	.63
76*	lb.	.53 -	.55
80*; 90*	lb.	.70 -	.72
95*	lb.	.70 -	.73
229*	lb.	.61 -	.63

STABILIZING AGENTS (Cont'd)

Vanstay AC* (dms.)	lb.	.45	.48
CE* (dms.)	lb.	.44	.47
HT* (dms.)	lb.	.87	.90
HTA* (dms.)	lb.	1.02	1.05
HTB* (dms.)	lb.	.70	.73
HTC* (dms.)	lb.	1.09	1.12
HTE* (dms.)	lb.	.80	.83
HTF* (dms.)	lb.	.77	.80
L* (dms.)	lb.	.32	.35
R* (dms.)	lb.	.67	.70
RR*; RRZ* (dms.)	lb.	.59	.62
RZ-25* (dms.)	lb.	.66	.69
S* (dms.)	lb.	.57	.60
SA* (dms.)	lb.	.81	.84
Z* (dms.)	lb.	.62	.65

STIFFENING AGENTS

Polyac*	lb.	—	1.85
Processinfi Stiffener 710*	lb.	.88	.90
Solvitose HDF, H. C-S, T, and E*	lb.	.22	.25
Versatil Gum 8-E*	lb.	.15	.19

SUN CHECKING AGENTS

Allied AA-1144*	lb.	.23	.24
AA-1177*	lb.	.15½	.16½
Antisol*	lb.	—	.23
Antisun* (Chipped)	lb.	.15½	.17½
(Slabbed)	lb.	.15	.17
Heliozone*	lb.	.31	.32
Microflake*	lb.	.20	.24
Nacconol NRSF*	lb.	.40½	.45
NBC*	lb.	—	1.67
Ross Sunproofing Waxes*	lb.	—	.15
Sunolite*	lb.	.16	.22
127*	lb.	.16½	.20½
154*	lb.	.23	.25
Sunproof*	lb.	.32	.33
Improved*	lb.	.25	.26
Super*	lb.	.41	.42
Jr.*	lb.	.22	.23
Tonox*	lb.	.54	.56

SURFACE ACTIVE AGENTS

Anhydrapent*	lb.	.56	.59
Anhydrol 6990*	lb.	.51	.56
6991*	lb.	.51	.56
Aquarex D*	lb.	—	.81
G*	lb.	—	.21
MDL*	lb.	—	.33
ME*	lb.	—	.82
NS*	lb.	—	.60
SMO*	lb.	—	.50
WAQ*	lb.	—	.22
Emulphor EL-620*	lb.	—	.40
EL-719*	lb.	—	.58
ON-870*	lb.	—	.55
Hyonics*	lb.	—	.28¾
Igepal CA-630	lb.	—	.29
CO-630; CO-730*	lb.	—	.29
CO-850; CO-880*	lb.	—	.29
Igepon CN-42*	lb.	—	.25
T-33*	lb.	—	.21
T-51*	lb.	—	.13½
T-77*	lb.	—	.49
Kessco 50201*	lb.	—	.44½
50203*	lb.	—	.44¼
18201*	lb.	—	.32
18203*	lb.	—	.35½
Lipal 9-N,* 11-0*	lb.	.28	.29
8-0,* 6-0*	lb.	.29	.30
25C,* 52C*	lb.	.34	.35
15T*	lb.	.23	.24
Nacconol NR (dlvd.)	lb.	.14½	.16
NRSF (dlvd.)	lb.	.40½	.45
Phosphonol 0* (dms.)	lb.	.40	.41
H* (dms.)	lb.	.80	.81
N* (dms.)	lb.	.50	.51
T* (dms.)	lb.	.60	.61
Pluronic L62*	lb.	.33½	.39
L64*	lb.	.33½	.39
Sellogen Gel*	lb.	—	.12¾
Soybean Lecithin	lb.	.13	.17
Synatol AV-60*	lb.	.28	.29

TACKIFIERS

Amalgamator Z-4*	lb.	.34	.35
Arcco 620-32B*	lb.	.20½	.21½
716-30*	lb.	.18½	.19½
1041-21*	lb.	.16½	.17½
Arcco A-26*	lb.	.18	.19
Bunaweld Polymer No. 780*	lb.	—	.24
Galex* (dms.)	lb.	.17¼	.20
Indopol H-300*	gal.	1.00	1.22
Koresin*	lb.	1.13	1.15
Liquid Rubber Flux*	lb.	—	.14
Nacconol NRSF* (dlvd.)	lb.	.40½	.45
Nilox Resin* (c.l.)	cwt.	—	16.00
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
PR-162 Resin Emulsion	lb.	.82	—
Resin V	lb.	—	.23½
Synthol* (dms.)	lb.	.26	.30¼
Vistac A*	lb.	.21½	.22¼
Vistanex LM Grades*	lb.	—	.45
Zirex* (c.l.)	cwt.	—	15.25
82 Resin Solid (dms.)	lb.	.13½	.14½
84 Resin Solid (dms.)	lb.	.13½	.14½

THICKENERS (For Latex)

Alcogum AN-6*	lb.	.06	.06½
AN-10*	lb.	.09	.10
AN-25*	lb.	—	.31
PA-15*	lb.	.13½	.17½
PA-15-B*	lb.	.13½	.17½
Betanol* (dms.)	lb.	.70	.95
CM Starch* (100 lb. bags)	lb.	26.85	—
Gomme Labolene*	lb.	.45	.47
Good-rite K-702*	lb.	.28½	.37
K-704*	lb.	.21	.22
K-705*	lb.	.30	.39
K-707*	lb.	.18	.19
K-708*	lb.	.28	.37
K-710*	lb.	.15	.16
Hycryl A-1000* (t.l.)	lb.	.090	.100
A-2000* (t.l.)	lb.	.335	.360
Hydroseal 3* (50 lb. bags)	lb.	9.19	—
Melojel* (100 lb. bags)	lb.	6.71	—
Modicol VD*	lb.	.13⅜	.15⅞
VE*	lb.	.13⅜	.16⅜
Polyco 296 BT*	lb.	.15	.16
296-N*; 530*	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.82
Sodium Silicate, 41°/1:3.2	cwt.	1.20	2.30
Solvitose Series*	lb.	.22	.25

VULCANIZING AGENTS

Peroxide

Di-cup	lb.	1.10	....
T	lb.	1.10	1.50
R	lb.	1.60	2.00
40C	lb.	.55	.75
UC XK-1960*	lb.	5.50	—

Selenium

Vandex*	lb.	—	6.50
VA-7*	lb.	—	.50

Sulfur

Blackbirdd* (c.l.)	cwt.	—	2.90
Cloud* (c.l.)	cwt.	—	2.85
Crystex*	lb.	.19½	.23
Darex Dispersed Sulfur*	lb.	.14	.16
Devil A* (c.l.)	cwt.	—	2.45
Dispersed Sulfur	lb.	.14	.16
Insoluble Sulfur 60*	lb.	.12½	.13
Ko-Blend IS*	lb.	—	.39
Mist* (Wettable) (c.l.)	cwt.	—	4.05
Spider* (c.l.)	cwt.	—	2.85
Star* (c.l.)	cwt.	—	4.90
Sulfasan R*	lb.	—	1.55
Tire* (c.l.)	cwt.	—	2.45
Tube* (c.l.)	cwt.	—	4.90
Vultac 2*	lb.	.47	.74
3*	lb.	.51	.78

Tellurium

Telloy*	lb.	—	5.00

WETTING AGENTS

Advawet No. 10*	lb.	—	.17
No. 33*	lb.	—	.48
Aerosol 18*	lb.	.37	.42
AY*	lb.	.75	.80
MA 80%*	lb.	.40	.45
OT 75% Aqueous*	lb.	.40	.45
OT 100%*	lb.	.75	.80
OT-B*	lb.	.65	.70

WETTING AGENTS (Cont'd)

Alrosol* (dms.)	lb.	.36	.40
Alrosperse*	lb.	—	.18
Alrowet D 65*	lb.	.31	.34
Anhydrol 6990* 6991*	lb.	.51	.56
Armacs*	lb.	.28	.77
Arquads*	lb.	.42	.61
Emcol 5100* (dms.)	lb.	—	.31
Energetic W-100	lb.	.28½	.35
Etho-Chemicals*	lb.	.26	.58
Ethomeen S/15*	lb.	.48	.50
T/15*	lb.	.46	.48
Hyonic PE-90*	lb.	.25	.27
PE-100*	lb.	.25	.27
Kessco E-122* (dms.)	lb.	—	.45
18201*	lb.	—	.32
Kreelon 4D* (dms.)	lb.	.13	.16
8G* (dms.)	lb.	.26	.28
Kyro EO* (dms.)	lb.	—	.29¼
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅞	.32⅛
Nacconol A* (dlvd.)	lb.	—	.52
NRSF* (dlvd.)	lb.	.40½	.45
SL* (dlvd.)	lb.	.084	.10
60S* (dlvd.)	lb.	.19	.225
Nekal WS-25	lb.	—	.38
WS-99	lb.	—	.95
Orvus AB Granules*	lb.	.16¼	.17¾
Parnol*	lb.	—	.13½
Regal Beads	lb.	.12¾	.16¾
H. D. Beads	lb.	.12¾	.15¾
Santomerse No. 3 Paste*	lb.	.26	.30
Sorapon SF-73*	lb.	—	.18
SF-78*	lb.	—	.30
Sorbit P*	lb.	.29	.31
Soybean Lecithin	lb.	.13	.17
Stablex G*	lb.	.50	.90
Tergitol 4* (dms., dlvd.)	lb.	.36½	.37½
7* (dms., dlvd.)	lb.	.43½	.44½
O8* (dms., dlvd.)	lb.	.36½	.37½
P28* (dms., dlvd.)	lb.	.18½	.19
Trenamine W-30	lb.	—	.15
Vultamol*	lb.	—	.17¾
Wetsit Conc.*	lb.	.35	.35

MISCELLANEOUS CHEMICALS

Aquesperse 30*	lb.	—	.11
Chiplac Paint	gal.	1.15	5.00
Copper Inhibitor No. 50*	lb.	—	1.20
D-Tac*	lb.	—	.22
Elastopar	lb.	2.05	2.07
2-Ethyl Hexanol	lb.	.23¾	.24¾
Fura-Tone Resin 1226*	lb.	.41	.43
MODX*	lb.	.38	.40
Nacconates*	lb.	.75	4.50
Para Resins*	lb.	.04	.04½
Pigmented Filmite* (dlvd.)	lb.	.16¾	—
Resorcin, Tech.	lb.	.77½	.81½
Rio Resin*	lb.	.70	.72
Rongalite CX*	lb.	—	.21½
Sherosopes*	lb.	.13½	.18¾
Sublac Resin PX-5*	lb.	.23½	.24½
Synpep*	lb.	.54	.60
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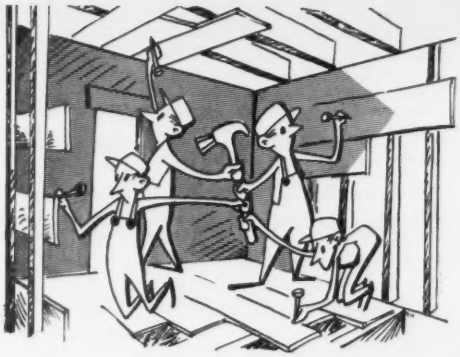

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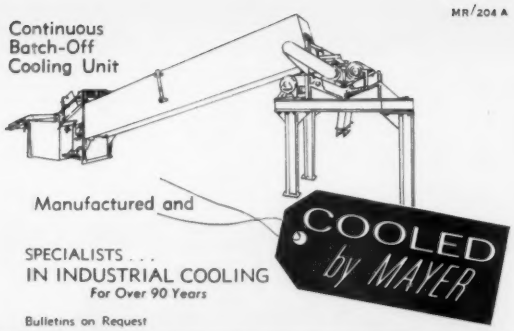

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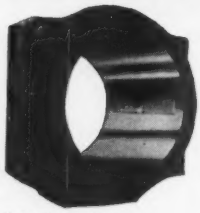

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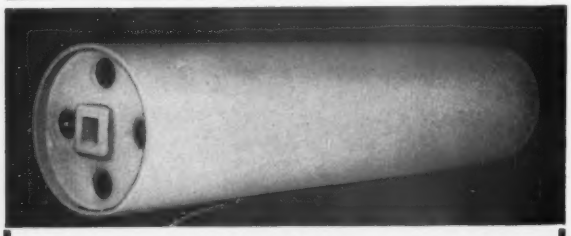

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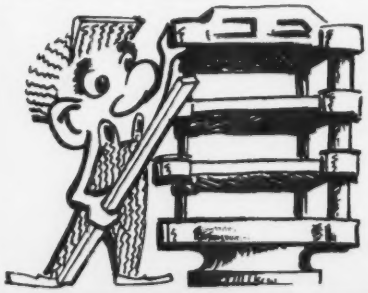

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SEPTEMBER, 1961

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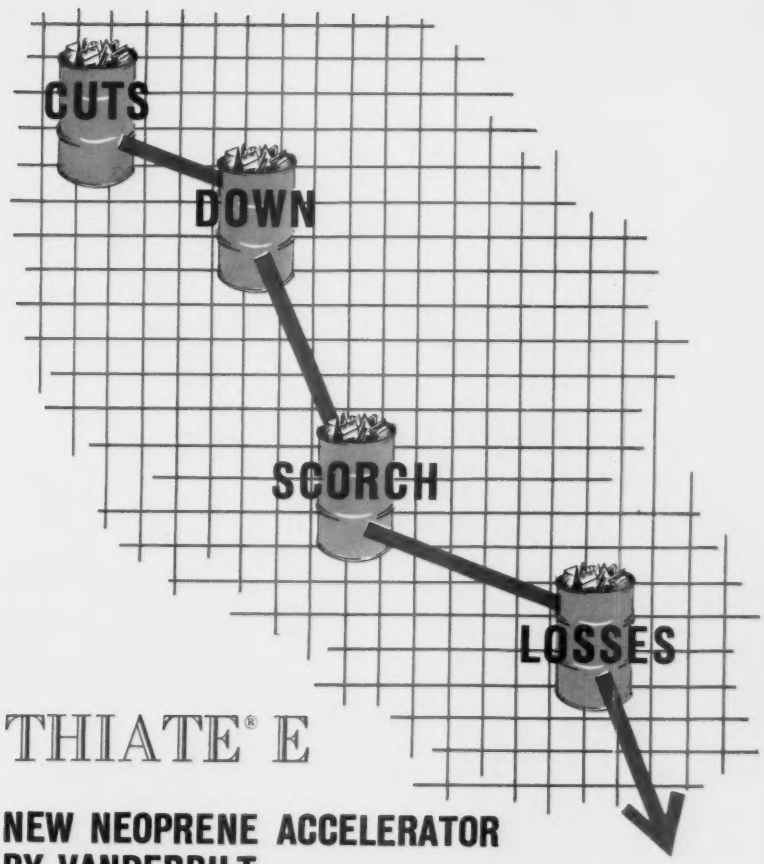

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